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SESSIONAL PAPERS

VOLUME 6

SECOND SESSION OF THE NINTH PARLIAMENT

OF THE

DOMINION OF CANADA

SESSION 1902

58380
24/11/02

VOLUME XXXVI

☞ See also Numerical List, page 3.

ALPHABETICAL INDEX

OF THE

SESSIONAL PAPERS

OF THE

PARLIAMENT OF CANADA

SECOND SESSION, NINTH PARLIAMENT, 1902.

A

Adulteration of Food 14
Agricultural Implements 72
Agriculture, Annual Report 15
Alien Labour Law 60
American Bank Note Co. 49
Archives, Canadian 18
Auditor General, Annual Report 1

B

Banks, Chartered 6
Belleville Post Office 59
Biology, Canadian 22*a*
Bonds and Securities 44
British Canadian Loan and Investment Co. 55
British Columbia Acts 67

C

Canadian Contingents to South Africa 63, 96
Canadian Pacific Railway:
  Appeal to Privy Council 80
  Business with Interior Department 70*a*
  Increase of Capital Stock 48
  Lands sold by 70
Cattle, Canadian 42
Central Experimental Farm 56
Chartered Banks 6
Chinese Immigration 54
Civil Service:
  Appointments and Promotions 47
  Examiners 31
  Insurance 41
  List 30
  Superannuations 38
Clinton, David 59*c*
Coal Mining in British Columbia 89
Cold Storage on Steamships 101
Commutations of Sentences 93
Coronation of the King 64
Contracts, Railways and Canals 61
Criminal Statistics 17

D

Devlin, C. R. 58
Disallowance of British Columbia Acts 67
Dividends unpaid in Banks 7
Dominion Lands 75, 75*a*
Dominion Police 52

E

Estimates ..... 3 to 5*c*
Ewing, Treadgold & Barwick 81, 81*a*
Exchequer Court 45, 45*a*
Experimental Farms 16

F

Farmer's Farm 56
Farm Land Values 62
Fisheries, Annual Report 22
Fishery Regulations 22*b*
Fishing Bounties 69

G

Geographic Board 21*a*
Geological Survey Report 26
Glasgow Exhibition 87
Governor General's Warrants 37

H

Hamilton and Guelph Mail 59*b*
Harbour Commissioners 23

I

Immigration 68
Indian Act 82
Indian Affairs, Annual Report 27
Inland Revenue, Annual Report 12
Insurance, Abstract 9
Insurance, Annual Report 8
Intercolonial Railway 100
Intercolonial Trade 77
Interior, Annual Report 25
Interior Department Officials 78

J

Japanese Immigration 54
Justice, Annual Report 34

L

Labour, Department of, Annual Report ... 36
Lake Simcoe 79
Langelier, Hon. F 94
Library of Parliament, Annual Report 33
List of Shipping 21*b*

M

MacKenzie & Mann 98
Mail, Hamilton and Guelph 59*b*
Manitoba Public Lands 83, 83*a*
Marconi's Wireless Telegraph Co 51, 51*a*
Marine, Annual Report 21
Marine Biological Station 22*a*
Militia and Defence, Annual Report 35
Monument to General Montgomery 91

N

New Brunswick Railways 74
North-west Irrigation Act 76
North-west Mounted Police 28

O

Ontario Subsidies 92
Ottawa Improvement Commission 39
Over-rulings of Treasury Board 43
Oyster-Fishing Licenses 99

P

Pan-American Exhibition 86
Paper Manufacturers' Combine 53
Paris Exhibition 57, 57*a*
Police, Dominion 52
Police, North-west Mounted 28
Postmaster General, Annual Report 24
Predaceous Fish 22*b*
Preferential Trade 102
Public Accounts, Annual Report 2
Public Printing and Stationery 32
Public Works, Annual Report 19

Q

Quebec Shoe Workers' Union 90

R

Railway Commissions, &c 20*a*
Railways and Canals, Annual Report 20
Railways and Canals Contracts 61
Restigouche Indians 85
Rossland Miners' Union 90*a*
Roy, Adrien 80
Royal Commission, Chinese and Japanese 54
Royal Commission *re* Paper Combine 53

S

Secretary of State, Annual Report 29
Seine Licenses in British Columbia 95
Shareholders in Chartered Banks 6
Shipping, List of 21*b*
Simcoe, Lake 79
Soulanges Canal 71
South African Constabulary, &c 63, 96
Steamship Subsidies 97
St. Vincent de Paul Penitentiary 84, 84*a*
Sugar Imports 73

T

Taylor, Colonel, Report of 89
Therien, H 59*d*
Thomas, Alphonse 59*c*
Timber Limits 88
Trade and Commerce, Annual Report 10
Trade and Navigation, Annual Report 11
Trade Unions 50
Treasury Board Over-rulings 43
Trout Hatching 22*b*

U

Unclaimed Balances in Banks 7
Unforeseen Expenses 40

V

Vegetables from United States 66, 66*a*
Violations of Alien Labour Law 60

W

Warrants, Governor General's 37
Weights, Measures, &c 13
Winnipeg Post Office 59*a*
Wireless Telegraph 51, 51*a*
Wurtele, Hon. Mr 94

Y

Yukon:
Concessions and Leases 65
Ewing, Treadgold & Barwick 81, 81*a*
Ordinances passed by Council 46
Timber Licenses 81*b*

See also Alphabetical Index, page 1.

LIST OF SESSIONAL PAPERS

Arranged in Numerical Order, with their titles at full length; the Dates when Ordered and when presented to the Houses of Parliament; the Name of the Member who moved for each Sessional Paper, and whether it is ordered to be Printed or Not Printed.

CONTENTS OF VOLUME 1.

(This volume is bound in two parts.)

1. Report of the Auditor General for the fiscal year ended 30th June, 1901. Presented 18th February, 1902, by Hon. W. S. Fielding.....*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 2.

2. Public Accounts of Canada, for the fiscal year ended 30th June, 1901. Presented 17th February, 1902. by Hon. W. S. Fielding.....*Printed for both distribution and sessional papers.*

3. Estimates of sums required for the services of Canada, for the year ending on the 30th June, 1903, Presented 17th February, 1902, by Hon. W. S. Fielding.
Printed for both distribution and sessional papers.

4. Supplementary Estimates for the year ending 30th June, 1902. Presented 6th March, 1902, by Hon. W. S. Fielding. ..... *Printed for both distribution and sessional papers.*

5. Further Supplementary Estimates for the year ending 30th June, 1902. Presented 30th April, 1902, by Hon. W. S. Fielding. .....*Printed for both distribution and sessional papers.*

5*a*. Supplementary Estimates for the year ending 30th June, 1903. Presented 7th May, 1902, by Hon. W. S. Fielding.....*Printed for both distribution and sessional papers.*

5*b*. Further Supplementary Estimates for the year ending 30th June, 1902. Presented 7th May, 1902, by Hon. W. S. Fielding.....*Printed for both distribution and sessional papers.*

5*c*. Further Supplementary Estimates for the year ending 30th June, 1902. Presented 14th May, 1902, by Hon. W. S. Fielding..... *Printed for both distribution and sessional papers.*

6. List of Shareholders in the Chartered Banks of Canada, as on the 31st December, 1901. Presented 21st April, 1902, by Hon. W. S. Fielding..... *Printed for both distribution and sessional papers.*

7. Report of dividends remaining unpaid, unclaimed balances and unpaid drafts and bills of exchange in Chartered Banks of Canada, for five years and upwards, prior to December, 1901. Presented 9th May, 1902, by Hon. W. S. Fielding..... *Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 3.

8. Report of the Superintendent of Insurance, for the year ended 31st December, 1901.
Printed for both distribution and sessional papers.

9. Abstract of Statements of Insurance Companies in Canada, for the year ended 31st December, 1901. Presented 26th March, 1902, by Hon. W. S. Fielding.
Printed for both distribution and sessional papers.

CONTENTS OF VOLUME 4.

10. Report of the Department of Trade and Commerce, for the fiscal year ended 30th June, 1901. Presented 18th February, 1902, by Sir Richard Cartwright.
Printed for both distribution and sessional papers.

CONTENTS OF VOLUME 5.

11. Tables of the Trade and Navigation of Canada, for the fiscal year ended 30th June, 1901. Presented 18th February, 1902, by Hon. W. Paterson.. . *Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 6.

12. Inland Revenues of Canada. Excise, etc., for the fiscal year ended 30th June, 1901. Presented 27th February, 1902, by Hon. W. S. Fielding.....*Printed for both distribution and sessional papers.*

13. Inspection of Weights, Measures, Gas and Electric Light, for the fiscal year ended 30th June, 1901. Presented 27th February, 1902, by Hon. W. S. Fielding.
Printed for both distribution and sessional papers.

14. Report on Adulteration of Food, for the fiscal year ended 30th June, 1901. Presented 17th February, 1902, by Hon. W. S. Fielding..... *Printed for both distribution and sessional papers.*

15. Report of the Minister of Agriculture, for the year ended 31st October, 1901. Presented 21st February, 1902, by Hon. S. A. Fisher ....*Printed for both distribution and sessional papers.*

16. Report of the Directors and Officers of the Experimental Farms, for the year 1901. Presented 8th April, 1902, by Hon. S. A. Fisher.. . .....*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 7.

17. Criminal Statistics for the year 1901..... ... .*Printed for both distribution and sessional papers.*

18. Report on Canadian Archives, 1901. Presented 23rd April, 1902, by Hon. S. A. Fisher.
Printed for both distribution and sessional papers.

19. Report of the Minister of Public Works, for the fiscal year ended 30th June, 1901. Presented 17th February, 1902, by Hon. J. I. Tarte.....*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 8.

20. Annual Report of the Department of Railways and Canals, for the fiscal year ended 30th June, 1901. Presented 19th February, 1902, by Hon. A. G. Blair.*Printed for both distribution and sessional papers.*

20*a*. Reports upon Railway Commissions, Railway Rate Grievances, and Regulative Legislation.
Printed for both distribution and sessional papers.

CONTENTS OF VOLUME 9.

21. Report of the Department of Marine and Fisheries (Marine), for the fiscal year ended 30th June, 1901. Presented 19th February, 1902, by Hon. J. Sutherland.
Printed for both distribution and sessional papers.

21*a*. Third Annual Report of the Geographic Board of Canada, 1901.
Printed for both distribution and sessional papers.

21*b*. List of Shipping issued by the Department of Marine and Fisheries, being a List of Vessels on the registry books of Canada, on the 31st December, 1901.
Printed for both distribution and sessional papers.

22. Report of the Department of Marine and Fisheries (Fisheries), for the fiscal year ended 30th June, 1901. Presented 26th February, 1902, by Hon. J. Sutherland.
Printed for both distribution and sessional papers.

22*a*. Contributions to Canadian Biology, being studies from the Marine Biological Station of Canada, 1901.
Printed for both distribution and sessional papers.

CONTENTS OF VOLUME 9—*Continued.*

22b. Special Reports on the Hatching and Planting of Trout; the Propagation and Planting of Predaceous Fish, and the Aim and Basis of Fishery Regulations.
Printed for both distribution and sessional papers.

23. Report of the Harbour Commissioners, etc., 1901....*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 10.

24. Report of the Postmaster General, for the year ended 30th June, 1901. Presented 17th February, 1902, by Hon. W. Mulock .....*Printed for both distribution and sessional papers.*

25. Annual Report of the Department of the Interior, for the fiscal year ended 30th June, 1901. Presented 20th February, 1902, by Hon. C. Sifton.. .....*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 11.

26. Summary Report of the Geological Survey Department for the calendar year 1901. Presented 14th April, 1902, by Hon. C. Sifton.....*Printed for both distribution and sessional papers.*

27. Annual Report of the Department of Indian Affairs, for the fiscal year ended 30th June, 1901. Presented 20th February, 1902, by Hon. C. Sifton.*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 12.

28. Report of the North-west Mounted Police, 1901. Presented 12th March, 1902, by Sir Wilfrid Laurier.
Printed for both distribution and sessional papers.

29. Report of the Secretary of State of Canada, for the year ended 31st December, 1901. Presented 27th February, 1902, by Hon. C. Fitzpatrick..... .... *Printed for both distribution and sessional papers.*

30. Civil Service List of Canada, 1901. Presented 19th February, 1902, by Hon. C. Fitzpatrick.
Printed for both distribution and sessional papers.

31. Report of the Board of Civil Service Examiners, for the year ended 31st December, 1901. Presented 20th March, 1902, by Hon. H. G. Carroll.....*Printed for both distribution and sessional papers.*

32. Annual Report of the Department of Public Printing and Stationery, for the year ended 30th June, 1901. Presented 27th February, 1902, by Hon. C. Fitzpatrick.
Printed for both distribution and sessional papers.

33. Report of the Joint Librarians of Parliament for the year 1901. Presented 13th February, 1902, by the Hon. The Speaker.....*Printed for sessional papers.*

34. Report of the Minister of Justice as to Penitentiaries of Canada, for the year ended 30th June, 1901. Presented 17th February, 1902, by Hon. C. Fitzpatrick.
Printed for both distribution and sessional papers.

35. Report of the Department of Militia and Defence of Canada, for the year ended 31st December, 1901. Presented 17th March, 1902, by Hon. F. W. Borden.
Printed for both distribution and sessional papers.

CONTENTS OF VOLUME 13.

36. Report of the Department of Labour, for the year ended 30th June, 1901. Presented 17th February, 1902, by Hon. W. Mulock.....*Printed for both distribution and sessional papers.*

37. Statement of Governor General's Warrants issued since the last session of parliament, on account of the fiscal year 1901-02. Presented 17th February, 1902, by Hon. W. S. Fielding.....*Not printed.*

38. Statement of all superannuations and retiring allowances in the civil service during the year ended 31st December, 1901, showing name, rank, salary, service, allowance and cause of retirement of each person superannuated or retired, also whether vacancy filled by promotion or by new appointment, and salary of any new appointee. Presented 17th February, 1902, by Hon. W. S. Fielding.
Not printed.

CONTENTS OF VOLUME 13—*Continued.*

39. Statement of receipts and expenditures of the Ottawa Improvement Commission, for the fiscal year ended 30th June, 1901. Presented 17th February, 1902, by Hon. W. S. Fielding.....*Not printed.*

40. Return showing the expenditure on account of unforeseen expenses from the 1st July, 1901, to the 13th February, 1902. Presented 17th February, 1902, by Hon. W. S. Fielding.. .....*Not printed.*

41. Statement in pursuance of section 17, of the Civil Service Insurance Act, for the fiscal year ended 30th June, 1901. Presented 17th February, 1902, by Hon. W. S. Fielding. . ..... *Not printed.*

42. Return to an address of the House of Commons, dated 19th February, 1902, for copy of all papers and correspondence exchanged between Canadian and British authorities, with reference to the embargo imposed by the British government on Canadian cattle. Presented 6th March, 1902.—*Mr. Bourassa*... ... .*Not printed.*

43. Return of over-rulings by the treasury board of the auditor general's decisions between the commencement of the session of 1901 and the session of 1902. Presented 18th February, 1902, by Hon. W. S. Fielding..... .... *Not printed*

44. Detailed statement of all bonds and securities registered in the department of the secretary of state of Canada, since last return, 11th February, 1901, submitted to the parliament of Canada under section 23, chapter 19 of the Revised Statutes of Canada. Presented 19th February, 1902, by Hon. C. Fitzpatrick..... ....*Not printed.*

45. Orders of the Exchequer Court. Presented 19th February, 1902, by Hon. C. Fitzpatrick. *Not printed.*

45*a*. Rules of the Exchequer Court, pursuant to 52 Victoria, chapter 38, section 2. Presented 19th March, 1902, by Hon. H. G. Carroll.....*Not printed.*

46. Ordinances passed by the Yukon council during the year 1901. Presented 19th February, 1902, by Hon. C. Fitzpatrick..... ....*Not printed.*

47. Return of the names and salaries of all persons appointed to or promoted in the Civil Service of Canada during the year 1901. Presented 19th February, 1902, by Hon. C. Fitzpatrick..*Not printed.*

48. Copy of a report of the committee of the honourable the privy council, approved by his excellency on the 23rd January, 1902, relative to a proposed increase of the capital stock of the Canadian Pacific Railway Company, by twenty millions of dollars and correspondence relating thereto. Presented 19th February, 1902, by Sir Wilfrid Laurier..... ....*Printed for sessional papers.*

49. Copy of a report of the committee of the honourable the privy council, approved by his excellency on the 31st May, 1901, relating to a contract with the American Bank Note Company and correspondence relating thereto. Presented 20th February, 1902, by Hon. W. S. Fielding.

Printed for sessional papers.

50. Annual return under chapter 131 (R.S.C), intituled : "An Act respecting Trade Unions." Presented 21st February, 1902, by Hon. C. Fitzpatrick.. ....*Not printed.*

51. Return to an order of the House of Commons, dated 26th February, 1902, for a copy of the correspondence relating to an agreement made between the government of Canada and the Marconi's Wireless Telegraph Company, Limited. Presented 26th February, 1902, by Sir Wilfrid Laurier.

Not printed.

51*a*. Memorandum of agreement made the seventeenth day of March, 1902, between Marconi's Wireless Telegraph Company, Limited, and the Marconi International Marine Communication Company, Limited, and His Majesty King Edward Seventh, represented herein by the Right Honourable Sir Wilfrid Laurier, G.C.M.G., President of the King's Privy Council for Canada. Presented 15th April, 1902, by Sir Wilfrid Laurier..... ....*Printed for sessional papers.*

52. Report of the Commissioner, Dominion Police Force, for the year 1901. Presented 26th February, 1902, by Hon. C. Fitzpatrick . ... *Not printed.*

53. Report of Commissioner and other documents in connection with the Royal Commission in *re* the alleged combination of paper manufacturers and dealers. Presented 21st April, 1902, by Hon. W. S. Fielding..... ... . *Printed for both distribution and sessional papers.*

54. Report of the Royal Commission on Chinese and Japanese Immigration. Part I.—Chinese Immigration. Presented 27th February, 1902, by Sir Wilfrid Laurier. Part II.—Japanese Immigration, together with all the evidence taken before the said Commission. Presented 14th April, 1902, by Sir Wilfrid Laurier.. .. ..*Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 13—*Continued.*

55. Statement of the affairs of the British Canadian Loan and Investment Company, as on the 31st December, 1901. Presented 3rd March, 1902, by the Hon. The Speaker.....*Not printed.*

56. Return to an order of the House of Commons, dated 19th February, 1902, showing the names and number of men employed on the 200 acres set apart at the Central Experimental Farm, Ottawa, as a farm proper to be handled as a farm, that is, as any farmer's farm might be handled; mentioned in the evidence of J. H. Grisdale, Esq., given Thursday, April 11th, 1901, at the morning session of the select standing committee on agriculture and colonization. The number of employees and the wages paid to each employee. The total crop of various kinds grown on said 200 acres, and the amount said total crop was sold for. Presented 4th March, 1902.—*Mr. Wilson*.....*Not printed.*

57. Supplementary return to an order of the House of Commons, dated 18th February, 1901, for copies of all correspondence, telegrams, letters, notes and memoranda exchanged between the Canadian commissioner at the Paris exhibition, or any member of the Canadian commission, and Lord Strathcona or the royal commission or the colonial secretary, in relation to the representation of Canada at the exhibition. Presented 4th March, 1902.—*Mr. Bourassa*. ....*Not printed.*

57*a*. Report of the Canadian Commission at the Paris exhibition. Presented 22nd April, 1902, by Hon. S. A. Fisher..... .....*Not printed.*

58. Return to an order of the House of Commons, dated 19th February, 1902, for correspondence between the department of the interior or the minister of the interior, and Mr. C. R. Devlin, with reference to a letter that appeared in *United Canada* on 11th May, 1901, and a letter that appeared in the *Montreal Herald* on the 18th May, 1901; in both of said letters Mr. C. R. Devlin made certain statements regarding members of this house. Presented 6th March, 1902.—*Mr. Wilson.*
Not printed.

59. Return to an order of the House of Commons, dated 19th February, 1902, showing: 1. The names of all employees in the post office at Belleville, Ontario, on June 30th, 1896, together with the age of each, date of entry in the service, and the salary of each on the said date. 2. The number of employees dismissed from the Belleville post office since June 30th, 1896, with cause and date of dismissal. 3. The number of employees superannuated, the date of their superannuation, reason for their superannuation, how much superannuation allowance has been allowed to each; giving the names of all said employees so superannuated who have asked to be superannuated. 4. How many employees were employed in the Belleville post office on 1st January, 1902; what were their names and the age and salary of each employee on said date, and date of appointment. Presented 7th March, 1902.—*Mr. Wilson*..... .....*Not printed.*

59*a*. Return to an order of the House of Commons, dated 10th March, 1902, for a list of the names of all permanent and temporary officials employed in the Winnipeg post office since the 1st of July, 1896; date of appointment, length of service, and salary up to the 1st of January, 1902. Presented 3rd April, 1902.—*Mr. LaRivière*..... .....*Not printed.*

59*b*. Return to an order of the House of Commons, dated 28th April, 1902, of copies of all tenders received by the post office department in June, 1901, for carrying mail between Hamilton and Guelph. Presented 7th May, 1902.—*Mr. Smith (Wentworth)*..... .....*Not printed.*

59*c*. Return to an order of the House of Commons, dated 14th April, 1902, for copies of all petitions, correspondence and any and all other documents addressed by any person or persons to the honourable the postmaster general upon which he or the department acted in dismissing, or which led to the dismissal of David Clinton, lately postmaster at Wellington, Ontario. Presented 9th May, 1902.—*Mr. Alcorn*..... .....*Not printed.*

59*d*. Return to an order of the House of Commons, dated 28th April, 1902, for a copy of the petition sent to the government asking for the dismissal of Mr. H. Therien, postmaster at Grandes Piles, in the province of Quebec; and copies of all correspondence between the government and all persons interested in the subject of such dismissal. Presented 14th May, 1902.—*Mr. Bell*.....*Not printed.*

59*e*. Return to an order of the House of Commons, dated 9th April, 1902, for copies of all correspondence, petitions, affidavits and documents relating to the dismissal of Alphonse Thomas as postmaster at La Prairie, P.Q. Presented 14th May, 1902.—*Mr. Monk*.....*Not printed.*

60. Return to an order of the House of Commons, dated 27th February, 1902, for copies of all letters, telegrams and other correspondence between the department of labour and the Canadian Pacific Railway, Mr. John Wilson and other parties, in respect of alleged violations of the Alien Labour Law, between June 1st and September 1st, 1901. Also between officers of the immigration department and the Canadian Pacific Railway. Presented 7th March, 1902.—*Mr. Puttee*..... .....*Not printed.*

CONTENTS OF VOLUME 13—*Continued.*

61. Return to an order of the House of Commons, dated 3rd March, 1902, showing:—1. All contracts awarded by the department of railways and canals during the year ending June 30th, 1901, in which the "Current Wages" clause was incorporated, and the amount of such contracts. 2. The number of such contracts in which the schedule of wages was prepared by the fair wages officers. 3. The number of such contracts in which the schedule of wages was prepared by the contractors and accepted by the department. 4. The number of such contracts which were unaccompanied by schedule of wages. 5. The number of contracts awarded by the department of railways and canals which did not contain either the "Current Wages" clause or a schedule of wages. Presented 11th March, 1902.—*Mr. Puttee*... ... *Not printed.*

62. Report on the trend of farm land values as indicated by the selling price. Presented 11th March, 1902, by Hon. S. A. Fisher.. ... *Not printed.*

63. Return to an order of the House of Commons, dated 27th February, 1902, showing: 1. Whether the government or any member thereof, by letter or otherwise, gave any public or private assurance that in the selection of officers for the Canadian South African constabulary, which left for South Africa, last year, preference would be given to those Canadian officers who have served in South Africa and to other officers of the Canadian militia. 2. What persons, officers or others, applied for commissions in said constabulary. What is the military record of each, either in Canada, South Africa or elsewhere 3. (*a*). What officers were selected and appointed: (*b*). What is the military record of each. 4. Who of those selected as officers had never before been officers. 5. Whether there were enough applications from officers of the Canadian militia to officer the constabulary, and the reason for their being passed over, and men without qualification, if there were any such, selected. 6. How many commissioned officers of the Canadian militia were enlisted in the first and second contingents, in the Royal Canadian Regiment, the Canadian Mounted Infantry, the Royal Canadian Dragoons, and the Canadian Artillery, as (*a.*) non-commissioned officers and (*b.*) as men. 7. How many non-commissioned officers and men of the permanent corps were enlisted in the corps named in question. How many of these were non-commissioned officers in South Africa. (*c.*) Why were the commissioned officers enlisted in the corps as privates, not given the non-commissions. Presented 11th March, 1902.—*Mr. Monk*... ... *Not printed.*

64. Return to an address of the House of Commons, dated 19th February, 1902, for a copy of all papers and correspondence relating to the coronation of his majesty the king: the imperial conference which is to be held in London, and the appointment of Canadian delegates to the same. Presented 11th March, 1902.—*Mr. Bourassa*... ... *Printed for sessional papers.*

65. Return to an address of the House of Commons, dated 19th February, 1902, for: 1. Copies of all applications for any portion of the ground covered by the Matson concession (so-called), or lease No. 9, in the Yukon district. 2. Copies of all applications for any portion of the ground covered by the Doyle concession (so-called), in the Yukon district. 3. Copies of all applications for any portion of the ground covered by the Bronson & Ray concession, in the Yukon district. 4. A memorandum showing the date on which the application in the Bronson & Ray concession was granted. 5. Copy of the application for all lay-overs in all these cases. 6. Copies of orders in council or other authority under which the minister of the interior granted any lay-over in these cases; and copy of the material, reports or other evidence upon which such lay-overs were granted. 7. A description of the Boyle concession and a map of same. 8. Copy of the application for Boyle concession. 9 The exact terms of the application in the case of the Milne concession. 10. The dates on which this application was made and granted. 11. Map showing ground covered. 12. The date when the application for the Slavin & Gates concession was made and filed. 13. Copy of Green's original map, with copy of field notes attached in the case of the Slavin & Gates concession. 14. Copy of telegram from the deputy minister of interior to E. C. Senkler as to the boundaries of this concession, dated on or about the 5th June, 1901. Presented 12th March, 1902.—*Mr. Taylor* .... *Not printed.*

66. Return to an order of the House of Commons, dated 20th February, 1902, for a statement in detail showing the quantity of vegetables imported from the United States and entered at the ports of Montreal and Toronto during the years 1900 and 1901, respectively, as well as of the amount of duties collected by the government of Canada during the said two years at each one of the said ports. Presented 14th March, 1902.—*Mr. Léonard*... ... *Not printed.*

66*a*. Return to an order of the House of Commons, dated 20th February, 1902, for copies of all petitions, resolutions, letters, etc., addressed to the government in relation to an increase or a readjustment of the duties on vegetables, and of all replies sent by the government to said resolutions, petitions and letters. Presented 24th March, 1902.—*Mr. Léonard*... ... *Not printed.*

CONTENTS OF VOLUME 13—*Continued.*

67. Return to an address of the House of Commons, dated 19th February, 1902, for a copy of all papers and correspondence relating to the disallowance of chapters 11 and 14 of the Statutes of 1900, province of British Columbia, viz.: "An Act to regulate immigration into British Columbia," and "An Act relating to the employment on works carried on under franchises granted by Private Acts." Presented 17th March, 1902.—*Mr. Bourassa*..... *Not printed.*

68. Return to an order of the House of Commons, dated 19th February, 1902, showing: 1. The amount of money spent each year from June 30th, 1891, to June 30th, 1901, on immigration. 2. The number of immigrants reported each year to have settled each year in the Dominion of Canada during the ten (10) years from 1891 to 1901, and the total for the ten years. 3. The number of immigrant agents employed by the Dominion government each year in Great Britain and Ireland from 1891 to 1901, and the total amount paid each year to the said agents, and the amount spent each year for printing and other expenses by the said agents. 4. The number of immigrant agents employed by the Dominion government each year in the continent of Europe from 1891 to 1901, and the total amount paid each year to the said agents, and the amount spent each year for printing and other expenses by the said agents. 5. The number of immigrant agents employed by the Dominion government each year in the United States of America from 1891 to 1901; and the total amount paid each year to the said agents; and amounts spent each year for printing and other expenses by the said agents; and by the government of the Dominion of Canada. Presented 18th March, 1902.—*Mr. Wilson*..... *Printed for sessional papers.*

69. Statement for parliament relative to fishing bounty payments for the year 1900-1901, required under section 4, of chapter 96, of the Revised Statutes of Canada, intituled: "An Act to encourage the development of the sea fisheries and the building of fishing vessels." Presented (Senate) 19th March, 1902, by Hon. R. W. Scott..... *Not printed.*

70. Return of all lands sold by the Canadian Pacific Railway Company, from the 1st October, 1900, to the 1st October, 1901. Presented 21st March, 1902, by Hon. W. S. Fielding ..... *Not printed.*

70*a*. Return (in so far as the department of the interior is concerned) of copies of all orders in council, plans, papers and correspondence which are required to be presented to the House of Commons, under a resolution passed on 20th February, 1882, since the date of the last return under such resolution. Presented 21st March, 1902, by Hon. W. S. Fielding..... *Not printed.*

71. Return to an address of the House of Commons, dated 3rd March, 1902, for copies for all applications for water powers and other similar rights on or connected with the Soulanges canal, and all correspondence with respect thereto, and all reports, letters and communications of or from engineers or other experts respecting the same. Also all leases granted to any person, firm or corporation of water powers or other similar rights on or connected with the above named canal. Presented 20th March, 1902—*Mr. Bennett*..... *Not printed.*

72. Return to an order of the House of Commons, dated 26th February, 1902, showing amount of the rebate paid on agricultural implements exported from Canada for the fiscal year ending 30th June, 1901, specifying amount paid to each firm. Presented 20th March, 1902—*Mr. Henderson. Not printed.*

73. Return to an order of the House of Commons, dated 6th March, 1902, showing: 1. The amount of refined sugar imported into Canada *(a)* from the first of January to 31st December, 1900; *(b)* from the first of January to the 31st of December, 1901; 2. The amount of raw sugar imported within same dates, each year separate, and the name of the country from which it has been imported. Presented 20th March, 1902—*Mr. Madore*..... *Not printed,*

74. Return to an order of the House of Commons, dated 10th March, 1902, for a tracing showing the principal railway lines in operation in New Brunswick, and showing the railway lines, or portions of such lines, over which postal cars are run. Presented 24th March, 1902—*Mr. Costigan*. *Not printed.*

75. Return of orders in council, which have been published in the *Canada Gazette* and in the *British Columbia Gazette*, between 1st January and 31st December, 1901, in accordance with the provisions of subsection *(d)* of section 38 of the regulations for the survey, administration, disposal and management of Dominion lands within the 40-mile railway belt in the province of British Columbia. Presented 21st March, 1902, by Hon. W. S. Fielding ..... *Not printed.*

CONTENTS OF VOLUME 13—*Continued.*

75*a*. Return of orders in council which have been published in the *Canada Gazette* between 1st January and 31st December, 1901, in accordance with the provisions of clause 91 of the Dominion Lands Act, chapter 54 of the Revised Statutes of Canada and its amendments. Presented 21st March, 1902, by Hon. W. S. Fielding..... *Not printed.*

76. Return of orders in council which have been published in the *Canada Gazette* between 1st January and 31st December, 1901, in accordance with the provisions of section 52 of the North-west Irrigation Act, chapter 35 of 61 Victoria. Presented 21st March, 1902, by Hon. W. S. Fielding.—*Not printed.*

77. Return to an address of the House of Commons, dated 19th February, 1902, for copies of all letters, telegrams and other correspondence between the governments of Canada, Australia and New Zealand or any member thereof, respecting trade transportation, cable and other subjects of intercolonial concern. Presented 26th March, 1902—*Mr. Campbell* ..... *Printed for sessional papers.*

78. Return to an order of the House of Commons, dated 10th March, 1902, for list of the names of all permanent and temporary officials of the several branches of the department of the interior, date of appointment, and their salaries, on the 1st July, 1896; also a similar list on the 1st July, 1901. Presented 26th March, 1902.—*Mr. LaRiviere*..... *Not printed.*

79. Return to an order of the House of Commons, dated 21st February, 1901, of all papers, reports and other data relative to the lowering of the waters of Lake Simcoe, with a view towards reclaiming certain flooded lands. Presented 26th March, 1902.—*Mr. McLeod*..... *Not printed.*

80. Return to an address of the House of Commons, dated 27th February, 1902, for a copy of the report from the judicial committee of the privy council, dated the 8th day of December, 1901, in the matter of an appeal from the court of king's bench for the province of Quebec (appeal side) between the Canadian Pacific Railway Company, appellant, and Adrien Roy, respondent. Presented 7th April, 1902.—*Mr. Lemieux* ..... *Not printed.*

81. Orders in council with respect to the application made by Messrs. Ewing, Treadgold and Barwick, to divert water for mining purposes. Presented 8th April, 1902, by Hon. C. Sifton.
Printed for both distribution and sessional papers.

81*a*. Partial return to an address of the House of Commons, dated 9th April, 1902: 1. For copies of all orders in council, petitions, applications, reports, telegrams, correspondence, grants, contracts, agreements, documents, and communications in writing, relating to or concerning the grant to or concession to A. N. C. Treadgold and others, or to the Hydraulic Mining Syndicate, either separately or associated with A. N. C. Treadgold, of any claims, rights, and privileges on Bonanza, Bear and Hunker Creeks or their tributaries, or elsewhere in the Yukon territory. 2. A description and plan showing the situation, location, area, and other particulars of all the claims, rights, and privileges so granted or conceded to the said A. N. C. Treadgold and others, or to the said Hydraulic Mining Syndicate, as aforesaid. Presented 23rd April, 1902.—*Mr. Borden (Halifax).*
Printed for both distribution and sessional papers.

81*b*. Return to an order of the House of Commons, dated 9th April, 1902, indicating: 1. The names of all grantees of permits to cut timber in the Yukon, to whom permits, licenses or leases have been issued since the 1st January, 1899. 2. The location of such grants. 3. The annual amount payable by the grantee, licensee or lessee. 4. The price or consideration of the grant. 5. The name in each case of the present holder of grant or lease, if transferred. 6. Whether each and every grant was publicly advertised for sale by auction. Presented 29th April, 1902.—*Mr. Monk.* ..... *Not printed.*

82. Return showing the reductions and remissions under section 141 as added to the Indian Act by section 8, chapter 35, 58-59 Victoria, during the fiscal year ended 30th June, 1901. Presented (Senate) 8th April, 1902, by Hon. R. W. Scott..... *Not printed.*

83. Return to an address of the Senate, dated 20th February, 1902, for copies of all orders in council, documents, memoranda, or other papers, relating to the transfer, from the federal to the provincial control, of public lands alloted for education in Manitoba, or relating to the payment by this government to the Manitoba government of any money—whether it be on the capital or on the interest—derived from the sales of such lands; also copies of all correspondence between the government or any member thereof, and the government of Manitoba or any member thereof, or any other persons, up to this date, in connection with the above matters. Presented (Senate) 9th April, 1902.—*Hon. Mr. Bernier* ..... *Printed for both distribution and sessional papers.*

CONTENTS OF VOLUME 13—*Continued.*

83*a*. Return to an address of the House of Commons, dated 19th February, 1902, for a copy of all correspondence, petitions, orders in council, and any and all documents in connection with the demands of the provincial legislature, with regard to the school lands in Manitoba; moneys derived from sales thereof, together with interest accrued thereon. Presented 25th April, 1902.—*Mr. LaRivière.*
Incorporated with 83.

84. Return to an address of the House of Commons, dated 9th April, 1902, for copies of all correspondence, papers, letters, telegrams, etc., between the department of justice and the authorities of the St. Vincent de Paul Penitentiary, relating to the leave granted to the present warden, as well as that which passed respecting the superannuation of the said warden. Presented 21st April, 1902.—*Mr. Léonard*.....*Not printed.*

84*a*. Return to an order of the House of Commons, dated 9th April, 1902, for copies of all correspondence, letters, claims, etc., addressed to the government in regard to the indemnity of Treffle Nantel, a guard at the St. Vincent de Paul Penitentiary, who died on or about the 12th September, 1900; as well as all documents relating to that matter. Presented 21st April, 1902.—*Mr. Léonard.*
Not printed.

85. Return to an order of the House of Commons, dated 9th April, 1902, for a copy of the report of Inspector McRae of the Indian department relating to the investigation held by him respecting the complaint by the Restigouche Indians against Indian Agent Peters, together with all correspondence and documents in connection therewith. Presented 21st April, 1902.—*Mr. Fowler*.....*Not printed.*

86. Report of the Commissioner for Canada at the Pan-American exhibition. Presented 22nd April, 1902, by *Hon. S. A. Fisher*.....*Not printed.*

87. Report of the Canadian Commissioner at the Glasgow exhibition. Presented 22nd April, 1902, by *Hon. S. A. Fisher*.....*Not printed.*

88. Return to an order of the House of Commons, dated 13th March, 1902, showing:—1. The number of timber limits, and where located, that have been disposed of by the government since July, 1896, in the province of Manitoba and North-west Territories. 2. The names of the purchasers in each case, and price paid for each limit. 3. Copies of tenders for each limit, and names of newspapers in which advertisements appeared. Presented 23rd April, 1902.—*Mr. Roche (Marquette).*
Not printed.

89. Return to an order of the House of Commons, dated 9th April, 1902, for any communications, reports, or other documents received by the government, or any member or department thereof, from Colonel Taylor, of Pittsburg, U.S.A., with reference to the deposits of coal and coal mining in South British Columbia, particularly the Crow's Nest Pass coal fields. Presented 25th April, 1902.—*Mr. Bennett*.....*Not printed.*

90. Return to an order of the House of Commons, dated 9th April, 1902, for copy of petition dated on or about November 29th, 1901, from the president of the Quebec Trades and Labour Council to the department of labour, and of all documents connected with said petition or mentioned therein, or correspondence ensuing therefrom in reference to the arbitration controversy or conflict between the Shoe Workers' Union of Quebec city and Mgr. L. N. Bégin, Archbishop of Quebec. Presented 28th April, 1902.—*Mr. Putnee*.....*Not Printed.*

90*a*. Return to an order of the House of Commons, dated 9th April, 1902, for copies of all letters, telegrams and other correspondence between the department of labour and the officers of the Rossland Miners' Union and other persons, in reference to the alleged violations of the Alien Labour Act in connection with the Rossland miners' strike. Presented 9th May, 1902.—*Mr. Smith (Vancouver)*.....*Not printed.*

91. Return to an address of the House of Commons, dated 14th April, 1902, for copies of all memorials, petitions or protests received respecting the erection of a monument to General Montgomery at Quebec, with dates; also copies of replies sent thereto. Presented 29th April, 1902.—*Mr. Clarke.*
Not printed.

92. Return to an address of the House of Commons, dated 9th April, 1902, for a statement of all moneys paid by the Dominion government to the province of Ontario during the calendar years 1900 and 1901, respectively; stating in each case how much of such moneys so paid was on account of subsidy, allowance for government, and interest, respectively. Also copies of all telegrams, letters, or correspondence of any kind in any way relating to or connected with the transmission of such moneys. Presented 30th April, 1902.—*Mr. Henderson*.....*Not printed.*

CONTENTS OF VOLUME 13—*Continued.*

93. Return to an order of the House of Commons, dated 26th February, 1902, showing (1st) the number of commutations of sentences that have been granted through the department of justice to prisoners convicted of arson or incendiarism during the years 1899, 1900 and 1901, respectively; (2nd) the places where the crimes were committed; (3rd) the sentences imposed. Presented 1st May, 1902.—*Mr. Monk*..... *Not printed.*

94. Return to an address of the Senate, dated 9th April, 1902, for a copy of the orders in council appointing: 1. The Honourable Mr. Wurtele, one of the judges of the court of appeal for the province of Quebec, chairman of the commission for the revision of the statutes of the Dominion of Canada. 2. The Honourable Justice François Langelier, one of the judges of the superior court of the province of Quebec, a judge of the court of appeal of the same province, in the room and place of the said Honourable Judge Wurtele. 3. Cancelling the aforesaid appointments; together with a copy of all correspondence exchanged on the subject of these appointments and the cancellation thereof. Presented (Senate) 2nd May, 1902.—*Hon. Mr. Landry*..... *Not printed.*

95. Return to an order of the House of Commons, dated 14th April, 1902, showing: 1. The number of seine licenses issued for the province of British Columbia for the year 1901. 2. To whom the said licenses were issued. 3. The number operated by those to whom they were issued, and by whom. 4. By whom those were operated which were not used by the parties to whom they were issued. Presented 5th May, 1902.—*Mr. Earle*..... *Not printed.*

96. Return to an address of the House of Commons, dated 19th February, 1902, for a copy of all papers and correspondence exchanged between his excellency the governor general, the Canadian government, or any of its members or departments, the officer commanding the Canadian militia, and the British authorities, in relation to the South African war, its conduct and its settlement; and the sending or recruiting of Canadian troops to South Africa,—for the three last years. Presented 7th May, 1902.—*Mr. Bourassa*..... *Not printed.*

97. Return to an order of the House of Commons, dated 3rd March, 1902, for copies of all contracts made during two years past between the government of Canada and all steamship companies with whom it is agreed that a subsidy, bonus or grant of any kind shall be given by the government of Canada for services to be rendered in connection with transatlantic, transpacific or West Indian business. Presented 9th May, 1902.—*Mr. Smith (Wentworth)*..... *Not printed.*

98. Copy of the finding of the judge of the exchequer court of Canada, in the matter between William Mackenzie and Donald D. Mann, claimants, and His Majesty the King, defendant. Presented 9th May, 1902, by Hon. C. Fitzpatrick..... *Not printed.*

99. Return to an order of the House of Commons, dated 9th April, 1902, showing what licenses, during the year 1900, were issued, entitling the persons named therein to fish for oysters on the beds planted by the government in the harbour of Shediac. And also showing to whom such licenses were issued, and on what dates they were respectively issued, and by whose authority they were issued in each instance, and whether such licenses, or any, and which of them were cancelled; and if so, how many, and on what date, and for what reason, such licenses were cancelled; and what quantity of oysters was secured under such licenses during the period they were in force. Presented 9th May, 1902.—*Mr. Borden (Halifax)*..... *Not printed.*

100. Return to an order of the House of Commons, dated 9th April, 1902, for a statement showing: 1. Into how many classes the employees of the Intercolonial Railway are divided. 2. The name, residence and the salary of each of the employees of the first class. 3. The name, residence and salary of each of those of the second class. 4. The number of those of the third class, and the total amount of the yearly salary paid them. Presented 10th May, 1902.—*Mr. Léonard*..... *Not printed.*

101. Return to an address of the Senate, dated 23rd April, 1902, of all correspondence which has taken place within the last two years between the government of Canada or any department or officer thereof, and any steamship company or agent of such company, engaged in the transportation of the produce of Canada from any port in Canada to Europe, regarding the ventilation of space on steamships used for storage during transportation of perishable products such as apples and cheese; also copies of all clauses in contracts with steamship companies relating to the ventilation of the holds or spaces between the decks of steamers employed as aforesaid; also a statement giving the names of all steamships and the owners thereof which have been equipped with means of generating cold air and distributing the same throughout their holds and between decks, in terms of the appropriation made for such purpose during last session of parliament, giving the cost to the government in the

CONTENTS OF VOLUME 13—*Concluded.*

case of each steamer; also a statement showing the daily minimum and maximum temperatures maintained during each voyage in the holds or between the decks of steamers equipped in terms of the said parliamentary appropriation of last session; also a statement showing the comparative results in the transportation of apples between steamers equipped as above described and steamers without any special means of ventilation; and also a statement giving the names and owners of steamers which it is proposed to equip as aforesaid, for the approaching season, and giving the port of departure from Canada of such steamers as well as of those already equipped as aforesaid. Presented (Senate) 13th May, 1902.—*Hon. Mr. Ferguson* ..... *Not printed.*

102. Return to an order of the House of Commons, dated 15th May, 1902, for copies of all papers relating to preferential trade. Presented 15th May, 1902.—*Mr. Belcourt*.. ..... *Not printed.*

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1901

PART I. EXCISE, &c.

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1901

[No. 12—1902.]

To His Excellency the Right Honourable The Earl of Minto, Governor General of Canada, &c., &c.

May it Please Your Excellency :

I have the honour to transmit to Your Excellency the Returns and Statistics of Inland Revenues of the Dominion of Canada, for the Fiscal Year ended June 30, 1901, as prepared and laid before me by the Deputy Minister of Inland Revenue.

All of which respectfully submitted.

M. E. BERNIER,
Minister of Inland Revenue.

CONTENTS

	Pages.
Report of the Deputy Minister of Inland Revenue, for the Fiscal Year ended June 30, 1901	i to xxvii
Financial Statements, as detailed below	1 to 60
Statistics, Hydraulic Rents, &c. (Appendix A), as detailed below	61 to 115
Expenditures, &c. (Appendix B), as detailed below	116 to 165
Index, Alphabetical	*Vide end.*

FINANCIAL

No. of Statements	——	Pages.
1	General Revenue Account—Showing account of Revenue accrued and collected from all sources during the year ended June 30, 1901	3
2	General Expenditure Account—Showing the cost of collecting the above	4–5
3	Excise Collection Divisions—In account with Revenue	6 to 9
4	" " Expenditure	10 to 13
5	Hydraulic Rents, &c.—Summary Statement of Lessees account	14
6	Bridges, Ferries, &c.—Lessees, &c., of—In account with Revenue	15–16
7	Culling Timber—Supervisor—In account with Revenue	17
8	" " " Expenditure	18
9	Bill Stamps—Distributors of— " Inland Revenue Department	19
10	Law Stamps— " " " "	19
11	Sundry Minor Revenues	20
12	" Expenditures	21
13	Comparative Statement of Excisable Articles taken for consumption, during the years ended June 30 1899, 1900 and 1901 respectively	22–23
14	Statement showing the amounts deposited monthly (by Inland Revenue Officers and others) to the credit of the Honourable the Receiver General on account of each of the above Revenues, respectively	24 to 27
15	Comparative Monthly Statement of Excise Revenue accrued—Showing increase or decrease of Revenue yielded by each article, respectively, during each month of the Fiscal Year, as compared with the respective periods of the previous year	28–29
16	Refunds—Statement of—Showing names of parties to whom, and under what authority, duties were refunded	30 to 41
17	Departmental Expenditure—Showing Expenditure on account of the Inside Service of the Department	42
18	Weights and Measures, Gas, Electric Light and Law Stamps—Statement showing Revenue accrued	43
19 (*a*)	Weights and Measures—Inspection Districts—In account with Revenue	44–45
19 (*b*)	" Old " " "	46
20 (*a*)	" Inspection Districts—In account with Expenditure	47–48
20 (*b*)	" Old " " "	49
21	Law Stamps—Distributors of—In account with Inland Revenue Department	51
21	Gas Inspection Districts—In account with Revenue	50–51
22	" " " Expenditure	52 to 55
23	Electric Light Inspection Districts—In account with Revenue	56
24	" " " Expenditure	57
25	Statement showing the transactions in connection with the manufacture of Methylated Spirits	58–59
26	Statement showing the amount voted, and the Expenditure authorized, for each Service for 1900-1901	60

STATISTICS (APPENDIX A).

EXCISE.

	Spirits.	Malt.	Malt Liquor.	Manufactured Tobacco.	Raw Leaf Tobacco.	Canada Twist Tobacco.	Cigars.	Petroleum.	Bonded Manufactures.	Acetic Acid.	Methylated Spirits.
	Pge	Pge	Pge	Pge	Pge	Pge	Pge	Pge	Pge	Pge	Pge
RETURN OF MANUFACTURES—Showing the number of Licenses issued and Fees collected, the materials used, the quantity produced, the amount of duties collected, ex-manufactory, and the amount of duties accruing upon excisable articles warehoused	62	72	78	80	....	....	88	....	96	105	....
COMPARATIVE STATEMENT of the above, for the years ended June 30, 1900 and 1901, respectively	64	74	79	81	....	....	90	....	98	105	....
RETURN OF DISTILLERIES—Showing their transactions during the year ended June 30, 1901	66	....	....	....	....	....	....	....	....	....	....
STATEMENT showing the transactions in Vinegar in the Bonded Manufactories for the year ended June 30, 1901	....	..	....	....	....	....	....	..	104	....	....
RETURN OF WAREHOUSE TRANSACTIONS—Showing the quantity of excisable goods remaining in bonded warehouses of each Collection Division, respectively, from previous years; quantity placed in warehouse ex-factory during the fiscal year ended June 30, 1900, placed in warehouse from other Collection Divisions; also, quantity ex-warehoused for consumption, with duty accrued thereon; ex-warehoused to be rewarehoused in other Collection Divisions; ex-warehoused for exportation; also quantity used in bonded factories, and remaining in warehouse June 30, 1901	68	74	....	82	84	....	92	....	100	106	....
COMPARATIVE STATEMENT of the above, for the years ended June 30, 1900 and 1901 respectively	70	76	....	83	86	....	93	....	102	107	....
RETURN OF REVENUE collected from Canada Twist Tobacco	....	....	....	....	....	87	....	....	....	....	....
COMPARATIVE STATEMENT of the above, for the years ended June 30, 1900 and 1901, respectively	....	....	....	....	.. .	87	....	....	....	....	....
RETURN OF FEES for Inspection of Petroleum, for the year ended June 30, 1901	....	..	....	....	....	....	....	94	....	....	....
COMPARATIVE STATEMENT of Petroleum Inspection Fees, for the years ended June 30, 1900 and 1901, respectively	....	....	....	....	....	....	....	95	....	....	....
METHYLATED SPIRITS—Statement showing the quantity of raw material on hand at beginning of year, raw material used, quantity produced and how disposed of	....	....	....	....	....	....	....	....	....	....	108

CULLING TIMBER.

No. of Statement.		Page.
36	Timber culled at Port of Quebec: description of timber, measurements, rates of Office and Culler's Fees charged and revenues accrued	109

HYDRAULIC AND OTHER RENTS.

37	Amount due from each Lessee or Purchaser, July 1, 1900 " accrued during the year ended June, 30, 1901 " paid by each Lessee or Purchaser, during the year ended June 30, 1901	110 to 115
37(a)	" remaining due by each Lessee or Purchaser on June 30, 1901	

SESSIONAL PAPER No. 12

EXPENDITURES—(Appendix B.)

	Inside Service.	Excise.	Culling Timber.	Minor Expenditures.	Inspection of Staples.	Weights and Measures.	Gas.	Electric Light.	Adulteration of Food.
	Pge	Pge	Pge	Pge	Pge	Pge	Pge	Pge	Pge
SALARIES.									
Paid to each Officer employed in collecting Revenue									
SUPERANNUATION.									
How much deducted from each Officer's salary									
INSURANCE FEES.									
How much deducted from each Officer's salary	144	116	133	140	140	147	151	155	141
RETIREMENT.									
How much deducted from each Officer's salary									
CONTINGENCIES.									
Authorized by the Department for office rent, fuel, travelling expenses, &c									

Distribution of Seizures 136
List of Persons employed during the year ended June 30, 1901 157
" " a portion of the year ended June 30, 1901 164

REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE

To the Honourable M. E. Bernier,
Minister of Inland Revenue.

Sir,—Herewith I have the honour to submit statements of the Inland Revenues collected by this department during the fiscal year ended June 30, 1901, with the usual information as to the cost of collection and statistics respecting the sources whence these revenues were derived.

The following summary comparison shows the accrued revenue for the years ended June 30, 1897, 1898, 1899, 1900 and 1901, respectively :—

	1897.	1898.	1899.	1900.	1901.
	$	$	$	$	$
*Excise	9,182,042	7,916,483	9,722,967	9,931,950	10,423,865
Public Works	13,632	8,915	5,090	5,366	4,805
Culling Timber	10,356	17,107	10,624	8,155	8,271
Weights and Measures, Gas and Law Stamps	58,228	64,570	73,499	78,510	81,987
Electric Light	6,844	9,425	11,520	14,452	15,568
Other Revenues	770	720	642	643	537
Methylated Spirits	.....	.....	.....	.....	73,675
Totals	9,271,872	8,017,220	9,824,342	10,039,076	10,608,708

*1897-8-9 and 1900 include Methylated Spirits.

The increase over last fiscal year being $569,632.

Details of Excise Revenue accrued during the undermentioned years.

	1.	2.	3.	4.	5.
	1897.	1898.	1899.	1900.	1901.
	$	$	$	$	$
Spirits	4,772,369	3,593,980	4,609,619	4,821,218	5,180,775
Malt liquor	6,805	6,851	6,807	7,174	6,569
Malt	1,032,727	589,896	849,468	910,537	977,330
Tobacco	2,557,011	2,894,285	3,320,168	3,281,640	3,337,848
Cigars	690,280	688,798	781,319	825,643	837,434
*Petroleum and Acetic Acid	42,018	44,648	46,060	5,505	8,910
Manufactures in bond	37,237	32,598	49,572	30,192	44,242
Seizures	3,363	7,373	10,713	6,071	1,292
Other receipts	17,965	21,163	24,192	34,132	29,465
†Methylated Spirits	22,267	36,891	25,049	9,838	73,675
Totals	9,182,042	7,916,483	9,722,967	9,931,950	10,497,540

* Petroleum for 1897-8-9 and 1900. Acetic Acid for 1901.
†Years 1897-8-9 and 1900 show only the net revenue over expenditure, and 1901 represents the gross revenue.

The quantity of spirits produced during the year, was 2,652,708 proof gallons, as compared with 2,658,557 proof gallons produced in the previous fiscal year. The raw material used in its production being as follows :—

	Lbs.
Malt	3,584,301
Indian corn	33,265,288
Rye	7,572,749
Wheat	12,775
Oats	399,130
Barley	37,380

The transactions of the several distilleries will be found stated in detail in Appendix A (Statement No. 3), pages 64 and 65.

		Proof Galls.
There were on July 1, 1900, in process of manufacture		124,219
Manufactured during the year		2,652,709
Returned to distilleries for re-distillation—Duty paid.	674	
" " " In bond	408,476	
		409 150
Received into distilleries from other sources—Duty paid		5,868
Total		3,191,946

This was disposed of as follows :—

	Proof Gallons.
Placed in warehouse under crown lock	3,067,919
Fusel-oil written off	8,310
Deficiency arising from rectification	847
Remaining in process of manufacture, June 30, 1901, by actual stock taking	113,310
Written off	1,560
Total	3,191,946

The following statement shows the warehousing transactions in spirits during the year ended June 30, 1901, and the four preceding years :—

Fiscal Years.	1	2	3	4	5	6	7	8	9
	In Warehouse at beginning of year.	Warehoused during the year. Ex-distillery.	Otherwise Warehoused.	Taken for consumption.	Exported.	Used in Bonded Factories.	Otherwise accounted for.	For Re-Distillation.	In Warehouse at end of year.
	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.	Pf. Galls.
1896-7	12,869,714	2,596,485	125,692	2,779,946	158,943	340,176	212,500	214,212	11,886,114
1897-8	11,886,114	1,766,030	94,798	1,874,479	87,471	321,515	135,318	68,123	11,260,036
1898-9	11,260,036	3,914,094	145,805	2,404,599	120,161	360,876	138,300	475,007	11,820,992
1899-1900	11,820,992	3,113,001	135,196	2,523,576	138,637	345,312	131,222	470,315	11,460,127
Totals	47,836,856	11,389,610	501,491	9,582,600	505,212	1,367,879	617,340	1,227,657	46,427,269
Annual average of four years ended June 30, 1900	11,959,214	2,847,402	125,373	2,395,650	126,303	341,970	154,335	306,914	11,606,817
1900-1901	11,460,127	3,067,919	155,295	2,707,919	148,154	352,705	212,516	408,477	10,853,570

The quantities exported being as follows :—

	Proof Gallons.
1896-7	158,943
1897-8	87,471
1898-9	120,161
1899-1900	138,637
1900-1901	148,154

The following statement exhibits the entire quantities upon which duties were collected during the several years recited therein. The total column will be found to accord with the figures shown in Financial Statement No. 13, page 23 :—

Fiscal Years.	Canadian Spirits.		Imported Spirits used in Bonded Factories. Paid difference between Customs and Excise Duty.	Total quantities upon which duty was collected.	Memorandum of Revenue accrued including License Fees.
	Paid duty Ex-distillery.	Paid duty Ex-warehouse.			
	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	Pf. Gallons.	$
1896-7	2,568	2,779,946	125,378	2,907,892	4,772,370
1897-8	3,866	1,874,479	94,681	1,973,026	3,593,980
1898-9	5,571	2,404,599	137,825	2,547,995	4,609,619
1899-1900	493	2,523,576	134,969	2,659,038	4,821,218
Totals	12,498	9,582,600	492,853	10,087,951	17,797,187
Annual average of four years ended June 30, 1900	3,125	2,395,650	123,213	2,521,988	4,449,297
1900-1901	914	2,707,919	155,117	2,863,950	5,180,775

MALT:

The following statement shows the transactions in malt during the year 1900-1901, and the four preceding years :—

Fiscal Years.	1	2	3	4	5	6	7	8
	In Warehouse at beginning of year.	Manufactured during the Year.	Increase by absorption.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse at end of Year.	Memorandum of Revenue accrued, including License Fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1896-7.....	26,341,230	47,544,706) *2,368,763)	572,765	68,443,353	377,771	339,698	7,666,642	1,032,727
1897-8.....	7,666,642	45,478,529) *2,497,134)	678,738	38,954,715	228,000	561,782	16,576,546	589,896
1898-9.....	16,576,546	61,020,839) *2,387,782)	552,363	56,212,822	301,774	2,240,747	21,782,187	849,468
1899-1900.....	21,782,187	61,497,029) *2,786,630)	730,799	60,284,064	327,950	1,663,296	24,521,335	910,538
Totals.....	72,366,605	215,541,103) *10,040,309)	2,534,665	223,894,954	1,235,495	4,805,523	70,546,710	3,382,629
Annual average of four years ended June 30, 1900.	18,091,651	53,885,276) *2,510,077)	633,666	55,973,738	308,874	1,201,381	17,636,677	845,657
1900-1901.	24,521,335	64,095,899) *3,565,270)	807,838	64,723,616	310,000	1,882,070	26,074,656	977,330

* Imported.

TOBACCO :

The following Statement shows the transactions during the Fiscal Years ended June 30, 1897, 1898, 1899, 1900 and 1901 respectively, in Tobacco, Snuff and Cigarettes.

Fiscal Years.	1	2	3	4	5	6	7	8	9	10
	In Warehouse, July 1.	Manufactured during the year.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse, June 30.	Raw Leaf taken for consumption.	Canadian Twist taken for consumption.	Total Tobacco taken for consumption.	Duty collected thereon, including License fees.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1896-7	2,056,579	8,797,845	10,323,472	197,310	50,622	283,020	*648,688	78,370	11,050,530	2,557,012
1897-8	283,020	10,519,500	9,001,157	174,595	33,526	1,593,242	8,506,199	55,379	17,562,735	2,894,285
1898-9	1,593,242	10,358,434	10,166,084	136,431	25,967	1,623,194	10,239,863	84,115	20,490,062	3,320,168
1899-1900	1,623,194	11,146,218	11,106,124	170,185	60,105	1,432,998	9,352,535	58,914	20,517,573	3,281,639
Totals	5,556,035	40,821,997	40,596,837	678,521	170,220	4,932,454	28,747,285	276,778	69,620,900	12,053,104
Average for four years ended June 30, 1900	1,389,009	10,205,499	10,149,209	169,630	42,555	1,233,114	7,186,821	69,195	17,405,225	3,013,276
1900-1901	1,432,998	11,943,805	11,636,900	392,614	49,285	1,298,004	9,848,804	57,597	21,543,301	3,337,848

*Duty imposed on Raw Leaf, April, 1897.

CIGARS :

The following statement shows the transactions in Cigars during the fiscal year ended June 30, 1901, and the four preceding years :—

Fiscal Years.	1	2	3	4	5	6	7	8
	In Warehouse July 1.	Manufactured during the Year.	Assessment to bring production up to Standard.	Taken for consumption.	Exported.	Otherwise accounted for.	In Warehouse June 30.	Memorandum of Revenue accrued including License Fees.
	No.	No.	No.	No.	No.	No.	No.	$
1896-97	12,684,190	109,234,900	5,575	113,276,105	145,425	....	8,503,135	690,280
1897-98	8,503,135	116,399,610	38,358	113,132,223	131,300	37,225	11,640,355	688,797
1898-99	11,640,355	133,134,122	9,106	128,919,098	88,250	....	15,776,235	781,319
1899-1900	15,776,235	139,389,477	8,430	138,041,707	189,975	17,300	16,925,160	825,643
Totals	48,603,915	498,158,109	61,469	493,369,133	554,950	54,525	52,844,885	2,986,039
Annual average of four years ended June 30, 1900	12,150,979	124,539,527	15,367	123,342,283	138,738	13,631	13,211,221	746,510
1900-1901	16,925,160	141,430,454	7,660	141,096,889	158,450	59,500	17,048,435	837,434

The revenue derived from goods manufactured in bond during the past five years has been as follows :—

1896–97	$37,237
1897–98	32,623
1898–99	33,494
1899–1900	30,192
1900–1901	44,242

ACETIC ACID :

The revenue derived from acetic acid during the last four years has been as follows :—

1897–98	$4,354
1898–99	16,078
1899–1900	9,647
1900–1901	8,910

INSPECTION OF PETROLEUM :

The quantity of Canadian Petroleum and Naphtha inspected during the year was as follows :—

	Gallons.
Petroleum	$11,197,315
Naphtha	1,477,663
Total	12,674,978

PUBLIC WORKS :

The revenue accrued from this source was as follows :—

	1899–1900.	1900–1901.
Hydraulic and other rents	$3,528	$3,570
Minor public works	1,838	1,235

CULLING TIMBER :

The amount accrued upon culling of timber was during 1900–1901, $8,270.78 ; the cost of the service (including $6,295.73 for annuities to retired cullers) having been $18,448.10.

WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT :

The usual special reports in relation to these services have been prepared, containing full statistical information.

The aggregate revenue accrued from these services was $92,428.92.

The cost of the three services being $103,726.93.

PREVENTION OF ADULTERATION OF FOOD AND AGRICULTURAL FERTILIZERS:

The usual supplementary report in relation to this service will be submitted containing details of the work done and the report of the analysts.

INSPECTION OF STAPLES:

The usual statistics in relation to this service will be found in Appendix B.

METHYLATED SPIRITS:

The quantity of methylated spirits manufactured during the year, was 94,653 proof gallons; 94,449 gallons were sold. A statement of details appears on pages 58 and 108.

Appendix C contains, as usual, the details concerning illicit stills seized during the year.

Appendix D shows the amount of Excise Revenue collected at each out-office and under various headings, separately.

The Administration of the Acts respecting "Inspection of Staples and Culling of Timber" having been transferred to the Department of Trade and Commerce, statistics relating to these services will not appear in the report of this Department after this year.

I have the honour to be, sir,

Your obedient servant,

W. J. GERALD,

Deputy Minister.

OTTAWA, August 10, 1901.

APPENDIX A.

TABLE showing the Annual Consumption per head of the undermentioned articles paying Excise and Customs Duties, and the Revenue per head derived annually.

YEARS.	DOMINION OF CANADA.									
	Quantity.					Duty.				
	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.	Spirits.	Beer.	Wine.	Tobacco.	Petroleum.
	Galls.	Galls.	Galls.	Lbs.	Galls.	$	$	$	$	$
1869	1·124	2·290	·115	1·755	·575	·761	·092	·037	·193	·041
1870	1.434	2·163	·195	2·190	1·103	·962	·085	·049	·259	·061
1871	1·578	2·490	·259	2·052	1·591	1·059	·095	·056	·336	·077
1872	1·723	2·774	·257	2·481	1·302	1·160	·108	·070	·422	·076
1873	1·682	3·188	·238	1 999	1·387	1·135	·120	·066	·350	·084
1874	1·994	3·012	·288	2·566	1·618	1·363	·119	·086	·442	·103
1875	1·394	3·091	·149	1·995	1·589	1·127	·114	·069	·428	·098
1876	1·204	2·454	·177	2·316	1·360	1·182	·098	·075	·513	·105
1877	·975	2·322	·096	2·051	1·103	·949	·109	·057	·446	·084
1878	·960	2·169	·096	1·976	.....	·927	·147	·052	·439	.....
1879	1·131	2·209	·104	1·954	.....	1·005	·125	·057	·449	.....
1880	·715	2·248	·077	1·936	.....	·772	·081	·055	·428	.....
1881	·922	2·293	·099	2·035	.....	·990	081	·073	·443	.....
1882	1·009	2·747	·120	2·150	.....	1,084	·098	·092	·485	.....
1883	1·090	2·882	·135	2·280	.....	1·186	·103	·097	·473	.....
1884	·998	2·924	·117	2·476	.....	1·074	·104	·082	·365	.....
1885	1·126	2·639	·109	2·623	.....	1·198	·111	·074	·393	.....
1886	·711	2·839	·110	2·072	.....	1·007	·091	·074	·502	.....
1887	·746	3·084	·095	2 062	.....	1·045	·100	·066	·514	.....
1888	·645	3·247	·094	2·093	.....	·944	·110	·066	·509	.....
1889	·776	3·263	·097	2·153	.....	1·107	·114	·068	·529	.....
1890	·883	3·360	·104	2·143	.....	1·257	·121	·072	·539	.....
1891	·745	3·790	·111	2·292	.....	1·094	·137	·080	·590	.....
1892	·701	3·516	·101	2·291	.....	1·156	·211	·075	·680	.....
1893	·740	3·485	·094	2·314	.....	1·235	·218	·070	·691	.....
1894	·742	3·722	·089	2·264	.....	1·235	·205	·060	·683	.....
1895	·666	3·471	·090	2·163	.....	1·124	·161	·056	·645	.....
1896	·623	3·528	·070	2·120	.....	1·159	·164	·047	·639	.....
1897	·723	3·469	·084	2·243	.....	1·341	·213	·041	·671	.....
1898	·536	3·808	·082	2·358	.....	1·306	·126	·041	·615	.....
1899	·661	3·995	·086	2·174	.....	1·367	·174	·045	·841	.....
1900	·701	4 364	·085	2·300	.....	1 455	·185	·044	·853	.....
1901*	·765	4·737	·100	2·404	.....	1·593	·198	·048	·875	.....
Average	·983	3·078	·124	2·250	.....	1·132	·132	·062	·496	.....

* The calculations for 1901 were based on a population of 5,338,883 as per figures supplied by the census officials while those from 1892 to 1900 inclusive, were based on approximate figures.

APPENDIX B.

STATEMENT showing Quantity of Certain Staple Articles of Canadian Commerce inspected under provisions of 37 Vic., Cap. 45, during year ended June 30, 1901, and the Fees accrued thereon, as returned to the Department of Inland Revenue by the respective Inspectors.

WHEAT AND OTHER GRAIN.

DISTRICTS.	WHEAT.																			
	Manitoba Hard.				Northern.				Spring.					Goose.				Frosted.	
	No. 1.	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.	American No. 2.	No. 1.	No. 2.	No. 3.	Rejected	American No. 3.	No. 1.	No. 2.	No. 3.	Rejected	No. 1.	No. 2.
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	....	.....	....	.....	....	...	..	19,200	292,800	50,580	4,860	300	94,080	600	72,540	300	.....	.....	.....
Peterborough	.....	....	....	.....	..	.....	.....	.....	217,518	22,060	....	....	.....	10,385	109,569	.....	.....	.....	.....
Toronto	..	.....	21,000	960	.....	.....	.....	..	65,600	48,900	14,600	16,900	.....	411,600	526,900	59,700	28,760	.....	....
Winnipeg	827,640	812,440	1,673,160	.....	3,040	4,560	39,520	..	380	.....	.....	80,180	.....	.....	....	.....	..	4,940	380
Totals	827,640	812,440	1,694,160	960	3,040	4,560	39,520	19,200	576,298	121,540	19,460	97,380	94,080	422,585	709,009	60,000	28,760	4,940	380

WHEAT AND OTHER GRAIN—*Continued.*

DISTRICTS.	WHEAT—*Continued.*																		
	Mixed Winter.				White Winter.					Red Winter.					White Fyfe.		No Grade.	Condemned.
	No. 1.	No. 2.	No. 3.	Rejected.	No. 1.	No. 2.	No. 3.	Rejected.	American No. 2 Hard Winter.	No. 1.	No. 2.	No. 3.	Rejected.	Feed.	No. 1.	No. 2.		
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	.....	45,600	....	2,400	17,280	...	300	900	659,640	15,300	102,360	300	300	.....	.....	.....	.....	.....
Peterborough	13,475	4,433	.....	1,225	11,401	51,351	.....	.....	.....	9,119	50,592	..	.....	.....	930	.....	.....	.....
Toronto	.....	325,400	76,425	45,700	72,600	185,600	69,700	39,850	.....	96,700	599,700	95,800	59,700	.....	.....	.....	.....	.....
Winnipeg	.....	....	....	24,700	.....	.....	.....	.....	.....	.....	....	.....	.....	760	3,800	380	2,350,720	28,880
Totals	13,475	375,433	76,425	74,025	101,281	236,951	70,000	40,750	659,640	121,119	752,652	96,100	60,000	760	4,730	380	2,350,720	28,880

STATEMENT showing the Quantity of certain Staple Articles of Canadian Commerce, &c.—*Continued.*

WHEAT AND OTHER GRAIN—*Continued.*

DISTRICTS.	OTHER GRAIN.															
	Indian Corn.						Buckwheat.				Oats.					
	No. 2.	No. 3.	No. 3 Yellow.	No Grade.	Rejected	American No. 2 Hard Corn.	No. 1.	No. 2.	No. 3.	Rejected	No. 1.	No. 2.	No. 3.	White Oats, No. 1.	White Oats, No. 2.	White Oats, No. 3.
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.
Montreal	.....	3,360	1,120	1,960	1,120	6,331,336	.....	186,748	240	3,600	273,428	1,146,758	226,644	.....	.....	.....
Peterborough	.....	.....	.....	.....	.....	.....	840	18,205	.....	.....	336,855	1,948	.....	.....	.....	.....
Toronto	35,785	4,760	.....	.....	3,265	.....	.....	19,720	528	360	.....	.....	.....	175,200	675,200	97,600
Winnipeg	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,420	23,920	.....
Totals	35,785	8,120	1,120	1,960	4,385	6,331,336	840	224,673	768	3,960	610,283	1,148,706	226,644	179,620	699,120	97,600

WHEAT AND OTHER GRAIN—*Continued.*

DISTRICTS.	OTHER GRAIN—*Continued.*														
	Oats—*Continued.*						Rye.					Barley.			
	Rejected.	Mixed No. 2.	Mixed No. 3.	Mixed Rejected.	American No. 2.	Feed and No Grade.	No. 1.	No. 2.	No. 3.	Rejected.	American No. 2.	No. 1.	No. 2.	No. 3.	
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	
Montreal	17,612	.....	.....	.....	642,940	.....	280	182,840	3,360	.....	150,976	19,440	167,736	36,288	
Peterborough	.....	.....	.....	.....	.....	.....	1,708	34,324	.....	.....	.....	28,390	92,309	3,358	
Toronto	35,850	26,400	3,600	1,350	.....	N.G. 37,740	9,600	15,856	355	396	.....	29,700	98,705	.....	
Winnipeg	87,800	6,800	.....	.....	.....	Feed 4,080	.....	.....	.....	.....	.....	.....	.....	3,740	
Totals	141,262	33,200	3,600	1,350	642,940	41,820	11,588	233,020	3,715	396	150,976	77,530	358,750	43,386	

WHEAT AND OTHER GRAIN—*Continued.*

Districts.	Other Grain—*Continued.*														
	Barley—*Continued.*					Flax.					Pease.				Fees.
	No. 3 Extra.	No. 4.	Feed.	American Feed.	Rejected.	No. 1.	No. 2.	No. 3.	No Grade.	Rejected.	No. 1.	No. 2.	No. 3.	Rejected.	
	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	Ctls.	$ cts.
Montreal	165,580	3,240	.....	11,856	864	.....	.....	.....	.....	.....	243,540	910,620	37,200	33,000	12,338 20
Peterborough	33,764	.....	.....	.....	.....	.....	.....	.....	...	.....	81,688	60,347	.....	.....	1,200 80
Toronto	76,280	.....	58,970	.....	15,600	.....	.....	.....	.....	.....	22,650	360,700	69,300	19,600	7,250 70
Winnipeg	340	340	340	.....	5,440	340	340	340	1,360	11,220	.....	.....	.....	.....	6,381 20
Totals	275,964	3,580	59,310	11,856	21,904	340	340	340	1,360	11,220	347,878	1,331,667	106,500	52,600	27,170 90

Inland Revenue Department,
Ottawa, August 10, 1901.

W. J. GERALD,
Deputy Minister.

STATEMENT showing Quantity of certain Staple Articles of Canadian Commerce inspected, &c.—*Continued.*

PICKLED FISH.

Districts.	Salmon.			Sea Trout.		Mackerel.		Herring.			Gaspereaux and Alewives.	Codfish.		Other Fish.		Fees.
	Tcs.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Brls.	½ Brls.	Boxes.	Brls.	½ Brls.	Brls.	Brls.	½ Brls.	
																$ cts.
Quebec	....	294	1	15	....	....	....	762	1	....	.. . .	2,516	2	56	1	228 42
Carleton, N.B.	...	....	..	....	..	....	....	.....	....	30	224	.....	...	....	..	12 10
St. John	....	....	..	....	....	....	....	826	7,687	....	1,219	....	....	....	..	332 86
Lunenburg	....	....	..	...	...	720	....	.....	.....	....	.....	.....	....	....	..	72 00
Totals	....	294	1	15	....	720	....	1,588	7,688	30	1,443	2,516	2	56	1	645 38

FISH OIL.

Districts.	Seal Oil.						Porpoise Oil.			Cod Oil.						Hake Oil.	Herring Oil.		Other Fish Oil.	Fees.
	No. 2 Pale.	No. 3 Straw.		No. 4 Bro'n.	No. 2 Straw		No. 1 Pale.	No. 2 Straw.		A.			B.			A.	A.			
	Tcs.	Pun.	Tcs.	Brls.	Brls.	Brls.	Tcs.	Pun.	Brls.	Pun.	Tcs.	Brls.	Pun.	Tcs.	Brls.	Brls.	Brls.	Tcs.	Pun.	
																				$ cts.
Quebec	15	16	174	117	.....	.....	1	3	..	16	570	...	..	9	..	.....	...	2	4	95 45
St. John	.....	..	...	...	.....	. ...	.....	..	4	.....	....	324	..	..	..	488	...	....	...	122 55
Lunenburg	.....	..	...	...	.....	.....	...	..	..	135	105	...	5	4	..	... ..	...	10	....	51 80
Totals	15	16	174	117	.. ..	.....	1	3	4	151	675	324	5	13	..	488	...	12	4	269 80

LEATHER AND HIDES.

Districts.	Leather	Hides.			Calf Skins.			Fees.
	No. 1.	No. 1.	No. 2.	No. 3.	No. 1.	No. 2.	No. 3.	
	Sq. ft.							$ cts.
Hamilton	.....	11,344	4,948	463	. ....	....	.....	837 75
Kingston	.....	6,025	563	476	.....	.....	.....	358 00
Toronto	.....	49,809	32,151	8,236	.. ..	.....	.....	4,509 80
Lévis	.....	4,397	1,836	90	.....	.....	.....	315 15
Montreal	.....	66,248	17,594	15,492	....	...	....	4,981 70
Quebec	6,075	15,731	7,945	1,002	... .	.....	.....	1,305 53
St. John	.....	6,000	421	236	.....	.... .	.....	332 85
Totals	6,075	159,554	65,458	25,995	.....	.....	.. ..	12,640 78

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

APPENDIX C.

STATEMENT of Seizures on account of Illicit Manufactures for Fiscal Year ended June 30, 1901.

Divisions.	Number.	Names.	Schedule Value.	Residences.	Dates.	Remarks.
Owen Sound..	4676	James Stevenson....	.....	Arron.....	Dec. 27, '00	Fine imposed and collected, $100.
Perth.....	8	F. W. Wilson & G. A. Burroughs.....	5 00	. . . .	Feb. 13, '01	No action taken.
Toronto.....	379	R. Hamilton.....	3 00	King Township..	Dec. 3, '00	No action to be taken.
Montreal.....	1047	Henri Archambault.	12 50	Montreal.....	July 10, '00	Department of Justice for prosecution.
	1048	A. Lauzon.....	3 40	"	" 16, '00	" "
	1049	G. Poirier	1 00	"	Sept. 12, '00	No action to be taken.
	1051	Damase Bouvrette...	1 00	St. Augustin Co.	Dec. 29, '00	Fined $100 and costs.
	1055	Maxime Martel. .. .	8 45	Montreal.....	Mar. 21, '01	Department of Justice for prosecution.
	1056	Z. Leblanc	12 80	St. Pierre aux Liens.....	" 28, '01	No action taken.
	1058	Henri Paquin.	3 00	Montreal...	May 7, '01	Fined $100 and costs or 3 mos. in jail.
	1059	David Rousseau.....	20 30	Outremont.....	" 15, '01	Department of Justice for prosecution.
	1062	I. Archambeault....	1 10	St. Antoine.....	June 15, '01	No action taken.
Quebec.....	518	Joseph Ouellet.....	6 50	L'Isle Verte....	Jan. 12, '01	"
	519	J. A. Delisle	5 00	Quebec.....	Feb. 12, '01	"
	522	Geo. Gervais.....	20 00	St. Casimir.	Aug. 2, '01	"
St. Hyacinthe.	74	Pierre Perron.....	10 00	St. Denis.....	July 19, '00	"
St. John, N.B.	103	Geo. Gothers.	3 00	Acadiaville.	Oct. 19, '00	Department of Justice for prosecution.
Pictou, N.S...	89	Unknown.....	46 00	.....	" 18, '00	No action taken.
	90	John Kennedy.. ..	12 00	Antigonish.....	Dec. 24, '00	"
	91	M. B. McDonald. ..	6 00	Little Mabou. ..	Jan. 26, '01	"
	92	Unknown.....	28 00	Upper Glencoe..	Feb. 7, '01	"
	93	Neil McDonald.	12 00	Cape Mabou...	" 19, '01	"
	94	Dan. McEachern....	35 00	Queenville.....	Mar. 18, '01	"
	95	John McLennan....	8 00	Meat Cove.....	" 9, '01	"

W. J. GERALD,
Deputy Minister.

INLAND REVENUE,
OTTAWA, August 10, 1901.

APPENDIX D.

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out Offices, during the Fiscal Year ended June 30, 1901.

Divisions.	Out Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Deseronto		1,323 18			1,399 00						2,722 18
	Picton		2,840 19									2,840 19
	Trenton		5,538 18									5,538 18
Brantford	Embro										10 00	10 00
	Ingersoll	150 00				514 60	1,556 70			140 72	25 00	2,387 02
	Norwich	50 00							2,059 66	600 00	10 00	2,719 66
	Paris										10 00	10 00
	Port Dover	300 00							991 67	300 00	10 00	1,601 67
	Port Rowan										10 00	10 00
	Simcoe	75 00				367 60	1,348 20				10 00	1,800 80
	Tilsonburg	100 00			2,102 55						10 00	2,212 55
	Woodstock	145 60	4,241 90		2,223 45	532 30	1,693 80			1,653 15	25 00	10,514 60
Guelph	Berlin	570 00	35,711 61		7,395 00	11,644 23	21,319 59				25 00	76,665 43
	Galt	487 00	171 09		1,404 45	559 00	1,740 96				25 00	4,387 50
	New Hamburg	50 00			4,185 00						10 00	4,245 00
	Preston	250 00			4,013 37	690 30	1,430 00				20 00	6,403 67
	Salem	50 00										50 00
	Waterloo	425 00			22,471 50	1,834 80					25 00	24,756 30
	" Distillery	250 00	418,285 14		3,405 00					4,863 05		426,803 19
Hamilton	Dundas	200 00			41,080 05							41,280 05
	Grenville	150 00			4,890 00							5,040 00
Kingston	Napanee	40 00	9,379 21			2,065 50					70 00	11,554 71
London	Alvinston										10 00	10 00
	Aylmer										10 00	10 00
	Dutton										10 00	10 00
	Forest										10 00	10 00
	Glencoe										10 00	10 00
	Lucan										10 00	10 00
	Parkhill										10 00	10 00
	Petrolea	20 00	7,422 57								25 00	2,467 57
	Sarnia	111 00	18,617 39			12,202 38				72 93	25 00	31,028 70
	St. Thomas	220 00	4,352 85		685 44	3,365 60	10,714 50				25 00	19,363 39
	Strathroy	120 00	2,792 67		4,320 00						10 00	7,242 67
	Waterford										10 00	10 00
	West Lorne										10 00	10 00

Owen Sound	Collingwood	125 00	2,211 83			18,049 50				125 64		20,511 97
	Kincardine	10 00								551 94		561 94
	Meaford	20 00	1,459 24			2,515 75						3,994 99
	Walkerton	200 00			4,545 27		759 00			142 70		5,646 97
Perth	Amprior	40 00	9,171 88								25 00	9,236 88
	Eganville	20 00	2,170 01			2,6[illegible] 00					20 00	4,872 01
	North Bay	20 00	652 60									672 60
	Pembroke	135 00	12,512 37			10,285 38	981 00			202 00	25 00	24,140 75
	Renfrew	20 00	6,105 20								20 00	6,145 20
	Sturgeon Falls	20 00	411 25									431 25
	Sudbury	20 00	8,889 72								25 00	8,934 72
Peterborough	Cobourg	70 00	7,374 66								25 00	7,469 66
	Lindsay	50 00			97 20						25 00	172 20
	Port Hope	270 00	2,731 73		6,700 41						25 00	9,727 14
Port Arthur	Wabigoon	20 00	2,487 34									2,507 34
Prescott	Brockville	420 00	6,188 69		5,707 05	1,219 90	4,510 50				25 00	18,071 14
	Gananoque	40 00	3,646 32								25 00	3,711 32
St. Catharines	Dunnville	95 00	1,108 64			111 90	403 50				25 00	1,744 04
	Fort Erie									100 00		100 00
	Grimsby										10 00	10 00
	Humberstone	37 50				41 90	132 60					212 00
	Niagara									100 00	10 00	110 00
	Niagara Falls	75 00				222 10	457 20				25 00	779 30
	Port Colborne	100 00			4,366 53							4,466 53
	Port Dalhousie										10 00	10 00
	Merritton										10 00	10 00
	Thorold										10 00	10 00
	Welland	95 00	1,633 44			119 50	441 00				10 00	2,298 94
Stratford	Goderich	170 00	2,817 44		2,657 25							5,644 59
	Listowell	125 00			2,250 00	772 10	3,348 00					6,495 10
	Palmerston	200 00			20,489 10							20,689 10
	St. Mary's	20 00	3,831 95			2,307 00						6,158 95
Toronto	Barrie	300 00			4,425 99	198 50	598 20					5,522 69
	Hornby	100 00			3,153 00							3,253 00
	Orillia	100 00			1,097 01							1,197 01
	Sault Ste. Marie	120 00				9,455 10	942 90					10,518 00
Windsor	Chatham	165 00	24,394 10		281 83	2,000 79	3,658 62				25 00	30,525 34
	Kingsville	50 00				4,709 10					10 00	4,769 10
	Leamington	250 00				8,806 73	2,790 00				25 00	11,871 73
	Ridgetown	85 00	234 06			452 95	1,261 80					2,033 81
Joliette	Berthierville	250 00	1,751 90									2,001 90
	L'Epiphanie	50 00					3,306 75					3,356 75
Montreal	St. Jérôme	95 00	14,693 81			3,511 80	8,886 15					27,186 76
	Ste. Thérèse	50 00			367 92							417 92
	Valleyfield	20 00	22,757 41				162 00					22,939 41
Quebec	Chicoutimi	75 00				19 40	33 30				25 00	152 70
	Gaspé	40 00	1,254 61			167 50						1,462 11
	Paspébiac	20 00										20 00
	Rivière du Loup	40 00	12,675 77								25 00	12,740 77
Sherbrooke	Granby	265 00				138,319 40	20,267 28					158,851 68

STATEMENT showing the Amount of Excise and other Revenues collected at each of the undermentioned Out Offices, during the Fiscal Year ended June 30, 1901—*Concluded.*

Divisions.	Out Offices.	Licenses.	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Petroleum	Manufactures in Bond.	Other Receipts.	Electric Light Inspection Fees.	Totals.
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	St. John's	110 00	8,124 55						1,286 69	51 70		9,572 94
Victoriaville	Drummondville	85 00				2,191 20	5,001 63					7,277 83
St. Hyacinthe	Drummondville					990 20	1,908 70					2,898 90
	St. John's		27,694 29				650 46		3,322 57	633 88		32,301 20
St. John, N.B.	Bathurst		1,033 04			1,707 25						2,740 29
	Fredericton	20 00				17,613 00				3 00	25 00	17,661 00
	Moncton	10 00				15,876 76				2 00	25 00	15,943 76
	Newcastle	20 00				5,218 00						5,238 00
	Sackville	20 00				2,526 25				4 00	10 00	2,560 25
	Sussex	20 00				1,409 00				1 00	10 00	1,440 00
	St. Stephens					2,112 50					25 00	2,137 50
	Woodstock	40 00	1,020 76			1,183 00					20 00	2,263 76
Halifax	Amherst, N.S.	20 00	2,325 85			707 50						3,053 35
	Truro	20 00				10,072 50						10,092 50
	Yarmouth	135 00				8,547 80	333 60				20 00	9,036 40
Pictou	Sydney	75 00				3,409 30					25 00	3,509 30
Winnipeg	Brandon	240 00	19,355 31		927 43	2,570 05	2,382 15				25 00	25,499 91
	Fort Francis	20 00	819 93									839 93
	Gretna	20 00	2,501 52			595 20						3,116 72
	Morden	20 00	537 75								10 00	567 75
	Neepawa										25 00	25 00
	Portage la Prairie	60 00	14,169 90			1,968 51					25 00	16,223 41
	Prince Albert	95 00	938 58		1,050 00	115 75					10 00	2,209 33
	Rat Portage	130 00	19,991 18		1,430 04						25 00	21,576 22
	Regina	10 00	718 19								25 00	753 19
	Selkirk	20 00	2,292 76								10 00	2,322 76
	Virden	20 00	8,790 94									8,810 91
Calgary	Edmonton	247 50	9,743 62		1,335 00	9,764 92					25 00	21,116 04
	Lethbridge	30 00	3,199 09									3,229 09
	Macleod	20 00	431 96									451 96
	Pincher Creek	50 00										50 00
Vancouver	Atlin	50 00			138 08							188 08
	Cascade City	20 00	1,424 52									1,444 52
	Cranbrook	100 00	9,292 02		1,419 00	437 51						11,248 53
	Fort Steele	50 00			824 43							874 43
	Golden	20 00	3,563 05			131 25						3,714 30

	Grand Forks	120 00	2,943 36		434 97							3,498 33
	Gree wood	207 50	13,046 37		1,550 25	59 40	106 50					14,970 02
	Kamloops	145 00	4,935 70		832 28	1,448 30	3,019 20					10,380 48
	Kaslo	90 00	1,643 51			1,140 00						2,873 51
	Kelona	65 00				733 72	932 70					1,731 42
	Moyle City	50 00										50 00
	Nelson	417 50	39,710 65		5,086 19	7,550 15	2,283 00					55,247 49
	New Westminster	155 00	1,445 16		2,113 57	879 60	1,935 00					6,528 33
	Revelstoke	272 50	3,258 04		599 31	653 78	336 00					5,119 63
	Rossland	285 00	18,679 92		6,999 01	234 90	642 00			50 40		26,891 23
	Sandon	145 00	1,009 64		630 60	85 30	331 50					2,202 04
	Trail	50 00			645 15							695 15
Victoria	Nanaimo	320 00	6,030 99		9,642 66	964 25	2,916 90			13 00		19,887 80
		12,405 50	894,514 10		189,972 34	344,220 46	115,522 89		7,660 59	9,611 11	1,270 00	1,575,176 99

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

FINANCIAL RETURNS, 1900-1901

DR. **No. 1.—GENERAL REVENUES ACCOUNT, 1900–1901.** CR.

Memo. of Refunds deducted below.	Amounts deposited to the credit of the Receiver General.	Balances due June 30, 1901.	Totals.	SERVICES.	Revenues of previous Years not collected July 1, 1900.	Revenues accrued, 1900-1901.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
180,707 22	10,426,608 40	40,110 47	10,466,718 87	Excise and Seizures, per Statement No. 3	42,854 26	10,423,864 61	10,466,718 87
.....	3,541 00	27,738 17	31,279 17	Hydraulic and other Rents, per Statement No. 5	27,709 17	3,570 00	31,279 17
.....	1,696 50	12,438 41	14,134 91	Minor Public Works, per Statement No. 6	12,899 41	1,235 50	14,134 91
.....	8,270 78	37,795 42	46,066 20	Culling Timber, per Statement No. 7	37,795 42	8,270 78	46,066 20
.....	54,385 56	2,217 82	56,603 38	Weights and Measures, per Statements Nos. 19 (A) and 19 (B)	2,155 03	54,448 35	56,603 38
.....	22,173 55	1,003 75	23,177 30	Gas Inspection, per Statement No. 21	764 50	22,412 80	23,177 30
.....	15,363 02	379 50	15,742 52	Electric Light Inspection, per Statement No. 23	174 75	15,567 77	15,742 52
.....	5,126 20	.....	5,126 20	Law Stamps, per Statements Nos. 10 and 18	.....	5,126 20	5,126 20
.....	.....	45 04	45 04	Bill Stamps, per Statement No. 9	45 04	.....	45 04
.....	537 30	.....	537 30	Sundry Minor Revenues, per Statement No. 11	.....	537 30	537 30
73 94	73,675 48	.....	73,675 48	Methylated Spirits, per Statement No. 25	.....	73,675 48	73,675 48
180,781 16	10,611,377 79	.....	10,733,106 37		.....	10,608,708 79	10,733,106 37
.....	180,781 16	.....	180,781 16	....LESS—Refunds as per Statement No. 16	.....	180,781 16	180,781 16
.....	10,430,596 63	121,728 58	10,552,325 21	..... Totals	124,397 58	10,427,927 63	10,552,325 21

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

DR.

No. 2.—GENERAL EXPENDITURES

Balances due to Collectors, &c., July 1, 1900.	Expenditures Authorized by the Department.					Balances due by Collectors, &c., June 30, 1901.	Totals.
	Salaries.	Contingencies.	Seizures.	Cullers' Fees.	Cullers' Annuities.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
49 08	310,121 33	90,910 53	369 73	.....	.....	343 98	401,794 65
.....	5,950 00	2,002 37	.....	4,200 00	6,295 73	75 00	18,523 10
.....	.....	.....	3,860 15	.....	.....	.....	3,860 15
21 94	12,250 00	20,073 30	.....	.....	.....	7,798 30	40,143 54
.....	44,285 43	5,859 70	.....	.....	.....	16 66	50,161 79
395 70	49,787 64	21,255 18	1 85	.....	.....	193 26	71,633 63
314 86	16,729 52	6,325 79	.....	.....	.....	212 88	23,583 05
348 00	2,400 00	6,359 37	.....	.....	.....	.....	9,107 97
.....	4,235 55	53,139 07	.....	.....	.....	.....	57,374 62
1,130 18	445,759 47	205,925 31	4,231 73	4,200 00	6,295 73	8,640 08	676,182 50

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

ACCOUNT, 1900–1901. Cr.

Services.	Balances due by Collectors, &c., July 1, 1900.	Amounts disbursed by the Receiver-General, on requisitions of the Department.	Deductions from Salaries for				Balances due to Collectors, &c., June 30, 1901.	Totals.
			Superannuations.	Insurance.	Retirement.	Guarantee.		
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Excise and Seizures, per Statement No. 4	367 75	392,332 08	5,377 95	71 76	1,182 07	2,413 96	49 08	401,794 65
Culling Timber, per Statement No. 8	75 00	18,306 70	103 96	.....	.....	37 44	.....	18,523 10
Excise Seizures, distributed per Statement No. 4, Appendix B	.....	3,860 15	.....	.....	.....	.....	.....	3,860 15
Sundry minor expenditures, per Statement No. 12	225 81	39,807 73	110 00	.....	.....	.....	.....	40,143 54
Departmental expenditure, per Statement No. 17	16 66	49,335 47	799 74	.....	.....	9 92	.....	50,161 79
Weights and Measures, per Statements Nos. 20 (A) and 20 (B)	353 26	70,656 23	361 99	80 04	147 15	34 96	.....	71,633 63
Gas Inspection, per Statement No. 22	244 56	23,071 89	154 84	.....	106 76	5 00	.....	23,583 05
Electric Light Inspection, per Statement No. 24	.....	9,107 97	.....	.....	.....	.....	.....	9,107 97
Methylated Spirits, per Statement No. 25	.....	57,286 72	.....	.....	.....	87 90	.....	57,374 62
Totals	1,283 04	663,764 94	6,908 48	151 80	1,435 98	2,589 18	49 08	676,182 50

W. J. GERALD,
Deputy Minister.

1-2 EDWARD VII., A. 1902

EXCISE,

No. 3.—Collection Divisions

Dr. (*For Details, see*

Balances due July 1, 1900.	Amount accrued during the Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Acetic Acid.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
250 82	118,749 87	50 00	4,226 42	2,977 60	1,641 00			50 00
626 34	24,255 23	150 00	11,449 99	6,726 40	21,803 37		3,151 33	
	11,857 79			365 75				
1,036 48	467,585 58	350 00	77,364 51	19,081 03	33,372 15			
510 41	202,323 81	150 00	65,751 95	334,236 48	47,207 19		6,079 85	
111 53	39,516 99	100 00	55,406 71	19,070 82	22,936 20		1,485 42	45 00
2,037 26	75,995 56	300 00	68,626 22	70,488 17	173,673 27			
769 06	257,339 65	100 00	5,907 58	41,464 98	511 50			117 48
	17,777 66	300 00	17,204 54	37,714 40	2,868 60			10 00
340 98	66,056 71		100 00	12,947 38	1,056 00			
	27,656 85	200 00	12,196 42	145 30	644 10			3 56
	16,134 86	50 00	1,622 58	2,855 74				
213 85	94,766 13	150 00	23,064 24	1,242 90	4,810 50		300 00	7 50
352 45	19,870 85	100 00	14,534 95	4,740 75	8,341 35			
308 50	32,074 29	250 00	28,208 50	7,785 20	10,642 74			
3,125 98	652,714 67	650 00	189,463 30	198,849 64	48,897 75	8,620 97	12,057 98	60 00
385 28	344,384 55	150 00	36,602 83	17,231 07	11,504 52		400 00	
522 89								
10,591 83	2,469,061 05	3,050 00	611,730 74	777,923 61	389,909 64	8,620 97	23,474 58	293 54
72 94	45,326 49	50 00		20,859 28	4,273 35			
9,741 24	1,095,247 86	525 00	147,587 55	1,695,739 19	290,805 74	288 65	9,829 42	693 30
904 64	424,472 91	200 00	55,814 74	114,839 51	24,522 40		4,010 40	97 40
1,683 20	138,443 64	100 00	17,036 78	144,290 43	39,229 46		1,669 19	182 45
	29,230 63							
218 98	77,593 07			1,556 61	5,415 66		4,026 36	25 00
	65,400 83			2,333 65	5,025 36			
	24,626 04			2,191 20	5,076 63			
3,295 57								
15,916 57	1,900,341 47	875 00	220,439 07	1,981,809 87	374,348 60	288 65	19,535 37	998 15
2,392 14	128,898 30	100 00	13,529 04	96,982 69	11,673 51		1,232 21	
1,442 62								
3,834 76	128,898 30	100 00	13,529 04	96,982 69	11,673 51		1,232 21	
217 00	67,596 32	200 00	36,753 84	106,226 96	3,744 54			
				29,917 85				
5,860 50								
6,077 50	67,596 32	200 00	36,753 84	136,144 81	3,744 54			
970 01	1,968 21	50 00	1,936 05	48,416 55				

SESSIONAL PAPER No. 12

1900-1901.

in Account with Revenues.

Appendix A.) CR.

Other Receipts.	Total Duties accrued.	Total Debits.	DIVISIONS.	Deposited to the credit of the Receiver General	Balances due June 30, 1901.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts	$ cts.
792 25	128,487 14	128,737 96	..Belleville.....	128,720 41	17 55	128,737 96
940 00	68,476 32	69,102 66	..Brantford.....	68,676 80	425 86	69,102 66
85 00	12,308 54	12,308 54	..Cornwall.....	12,308 54	.....	12,308 54
4,923 05	602,676 32	603,712 80	..Guelph.....	603,502 56	210 24	603,712 80
1,694 28	657,443 56	657,953 97	..Hamilton.....	656,777 52	1,176 45	657,953 97
523 85	139,084 99	139,196 52	..Kingston.....	138,733 69	462 83	139,196 52
221 00	389,304 22	391,341 48	..London.....	389,570 09	1,771 39	391,341 48
334 50	305,775 69	306,544 75	..Ottawa.....	306,544 75	.....	306,544 75
180 00	76,054 60	76,054 60	..Owen Sound.....	76,054 60	.....	76,054 60
405 20	80,565 29	80,906 27	..Perth.....	80,755 53	150 74	80,906 27
60 00	40,906 23	40,906 23	..Peterborough.....	40,707 64	198 59	40,906 23
80 00	20,743 18	20,743 18	Port Arthur.....	20,743 18	.....	20,743 18
196 87	124,538 14	124,751 99	..Prescott.....	124,365 15	386 84	124,751 99
140 00	47,727 90	48,080 35	..St. Catharines.....	47,906 94	173 41	48,080 35
80 00	79,040 73	79,349 23	..Stratford.....	79,050 83	298 40	79,349 23
3,459 45	1,114,773 76	1,117,899 74	..Toronto.....	1,117,194 01	705 73	1,117,899 74
6,221 14	416,494 11	416,879 39	..Windsor.....	415,983 03	896 36	416,879 39
.....	.....	522 89	..Suspense Account.....	.....	522 89	522 89
20,336 59	4,304,400 72	4,314,992 55	.....*Ontario*.....	4,307,595 27	7,397 28	4,314,992 55
1,140 00	71,649 12	71,722 06	..Joliette.....	71,693 81	28 25	71,722 06
3,132 62	3,243,849 33	3,253,590 57	..Montreal.....	3,245,305 13	8,285 44	3,253,590 57
922 75	624,880 11	625,784 75	..Quebec.....	625,232 75	552 00	625,784 75
192 70	341,144 65	342,827 85	..Sherbrooke.....	341,103 69	1,724 16	342,827 85
60 00	29,296 63	29,290 63	..Sorel.....	29,290 63	.....	29,290 63
705 03	89,321 73	89,540 71	..St. Hyacinthe.....	88,842 37	698 34	89,540 71
60 00	72,819 84	72,819 84	..Three Rivers.....	72,819 84	.....	72,819 84
40 00	31,933 87	31,933 87	..Victoriaville.....	31,933 87	.....	31,933 87
.....	.....	3,295 57	..Suspense Account.....	.....	3,295 57	3,295 57
6,253 10	4,504,889 28	4,520,805 85	.....*Quebec*.....	4,506,222 09	14,583 76	4,520,805 85
722 05	253,137 80	255,529 94	..St. John.....	253,126 97	2,402 97	255,529 94
.....	.....	1,442 62	..Suspense Account.....	.....	1,442 62	1,442 62
722 05	253,137 80	256,972 56	.....*New Brunswick*.....	253,126 97	3,845 59	256,972 56
386 16	214,907 82	215,124 82	..Halifax.....	213,980 51	1,144 31	215,124 82
60 00	29,977 85	29,977 85	..Pictou.....	29,977 85	.....	29,977 85
.....	.....	5,860 50	..Suspense Account.....	.....	5,860 50	5,860 50
446 16	244,885 67	250,963 17	.....*Nova Scotia*.....	243,958 36	7,004 81	250,963 17
20 00	52,390 81	53,360 82	..Charlottetown, *P.E.I.*...	53,015 52	345 30	53,360 82

1-2 EDWARD VII., A. 1902

EXCISE,

No. 3.—Collection Divisions

Dr. (*For Details, see*

Balances due July 1, 1900.	Amount Accrued during the Year, including License Fees.							
	Spirits.	Malt Liquor.	Malt.	Tobacco.	Cigars.	Acetic Acid.	Bonded Manufactures.	Seizures.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1,277 56	291,223 66	325 00	28,573 21	189,526 99	27,572 40	.....	.....	.....
.....	29,522 89	200 00	8,775 05	2,564 49	222 30	.....	.....	.....
1,277 56	320,746 55	525 00	37,348 26	192,091 48	27,794 70	.....	.....	.....
4,022 75	172,451 13	1,450 40	30,955 47	67,506 22	18,873 80	.....	.....	.....
163 28	119,712 09	318 50	24,637 68	36,973 05	11,088 90	.....	.....	.....
4,186 03	292,163 22	1,768 90	55,593 15	104,479 27	29,962 70	.....	.....	.....
42,854 26	5,180,775 12	6,568 90	977,330 15	3,337,848 28	837,433 69	8,909 62	44,242 16	1,291 69
.....	52,697 45	.....	76,952 12	50,515 15	37 50	.....	150 00	55 00
.....	5,128,077 67	6,568 90	900,378 03	3,287,333 13	837,396 19	8,909 62	44,092 16	1,236 69

Inland Revenue Department,
Ottawa, August 10, 1901.

SESSIONAL PAPER No. 12

1900-1901.

in Account with Revenue—*Concluded.*

Appendix A.) CR.

Other Receipts.	Total Duties accrued.	Total Debits.	DIVISIONS.	Deposited to the credit of the Receiver General.	Balances due June 30, 1901.	Total Credits.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
737 10	537,958 36	539,235 92	..Winnipeg.....	538,384 30	851 62	539,235 92
150 00	41,434 73	41,434 73	..Calgary.....	41,380 03	54 70	41,434 73
887 10	579,393 09	580,670 65	....*Manitoba and N. W. T.*.	579,764 33	906 32	580,670 65
660 00	291,897 02	295,919 77	..Vancouver.....	290,015 66	5,904 11	295,919 77
140 00	192,870 22	193,033 50	..Victoria.....	192,910 20	123 30	193,033 50
800 00	484,767 24	488,953 27	....*British Columbia*.....	482,925 86	6,027 41	488,953 27
29,465 00	10,423,864 61	10,466,718 87	....Totals.....	10,426,608 40	40,110 47	10,466,718 87
300 00	180,707 22	.....				
			..LESS—Refunds as per Statement No. 16.			
29,165 00	10,243,157 39	.....	..Net Revenue.			

W. J. GERALD,
Deputy Minister.

1-2 EDWARD VII., A. 1902

EXCISE,

No. 4.—Collection Divisions

Dr. (*For Details, see*

Balances due by Collectors, July 1, 1901.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for				Balances due to Collectors, June 30, 1901.	Totals.	Divisions.
		Superannuation.	Insurance.	Retirement.	Guarantee.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
43 98	7,760 27	152 67	....	6 71	24 60	....	7,988 23	..Belleville..... .....
.....	8,746 76	144 03	.. ...	76 52	29 52	.....	8,996 83	..Brantford .....
.... ..	1,074 25	20 00	.....	.....	3 60	.... ..	1,097 85	..Cornwall ....
.....	15,988 20	323 72	.....	6 71	50 40	.....	16,369 03	. Guelph .....
... .	20,016 13	361 18	. ....	110 19	71 52	....	20,559 02	..Hamilton ....
....	8,558 49	160 34	.....	.....	28 08	.....	8,746 91	..Kingston .....
.....	18,315 46	349 08	71 76	65 48	58 68	.....	18,860 46	..London.....
.....	6,268 55	49 11	.....	180 00	23 16	.....	6,520 82	.. Ottawa.....
.....	5,147 98	77 88	.....	35 58	15 12	.....	5,276 56	..Owen Sound.....
....	7,273 18	67 96	.... .	159 87	32 76	.....	7,533 77	..Perth..... .....
.....	3,955 97	47 96	....	61 98	14 34	....	4,080 25	..Peterborough.....
23 77	1,099 63	19 96	... .	2 15	6 18	.....	1,151 69	..Port Arthur.....
.....	10,434 91	179 88	.....	23 15	36 48	.....	10,674 42	..Prescott.....
.....	4,538 44	100 52	.....	6 71	16 56	.....	4,662 23	..St. Catharines.....
. .....	6,050 98	110 88	.....	1 24	17 42	....	6,180 52	..Stratford.....
.....	35,260 04	634 71	.....	224 01	125 88	.....	36,244 64	..Toronto ....
.....	18,992 72	360 27	.....	30 00	68 40	49 08	19,500 47	..Windsor.....
.....	8,015 18	136 00	.....	... ..	27 00	.....	8,178 18	..District Inspectors... .
67 75	187,497 14	3,296 15	71 76	990 30	649 70	49 08	192,621 88	....*Ontario*.....
....	4,056 83	28 04	.....	75 80	16 50	.....	4,177 17	..Joliette..... .
.....	40,982 31	643 42	.....	372 46	150 84	.....	42,149 03	..Montreal..... . .
..... .	14,404 65	221 08	.. ...	25 04	44 64	... .	14,695 41	..Quebec .....
.....	6,836 14	61 40	. ..	156 35	26 64	.....	7,080 53	..Sherbrooke.....
.....	1,002 35	20 00	.....	.....	3 60	.....	1,025 95	..Sorel ....
.....	3,834 06	28 22	.....	87 99	20 15	....	3,970 42	..St. Hyacinthe ....
.....	2,046 82	39 00	.....	.....	6 48	.....	2,092 30	..Three Rivers..... .....
... .	1,178 48	24 52	... ..	19 84	5 52	.....	1,228 36	..Victoriaville.....
.....	4,701 76	42 00	....	125 00	18 00	.....	4,886 76	..District Inspectors.....
.....	79,043 40	1,107 68	.....	862 48	292 37	.....	81,305 93	....*Quebec*.....
.....	7,951 97	155 07	.....	.....	29 04	.....	8,176 08	..St. John..... .....
....	2,893 46	50 00	.....	.....	9 00	.....	2,952 46	..District Inspector.....
... :...	10,885 43	205 07	.....	.....	38 04	.....	11,128 54	....*New Brunswick*.....
....	10,859 63	213 96	.....	.....	38 16	....	11,111 75	..Halifax ... .
.....	1,978 94	19 96	.....	34 96	6 48	.....	2,040 34	..Pictou ..... .
... . ..	12,838 57	233 92	....	34 96	44 64	.....	13,152 09	....*Nova Scotia*.... ....
100 00	2,242 87	43 96	.....	.....	6 48	... .	2,393 31	....*Charlottetown*.....
200 00	14,464 74	208 45	.....	144 72	51 12	.. ..	15,069 03	..Winnipeg.....
. ...	3,716 29	43 04	.....	60 00	12 24	.....	3,831 57	..Calgary, N.W.T.....
....	3,637 15	50 00	.....	.....	9 00	.....	3,696 15	..District Inspector.....
200 00	21,818 18	301 49	.....	204 72	72 36	.....	22,596 75	... *Manitoba and N.W.T.*

SESSIONAL PAPER No. 12

1900–1901.

in Account with Expenditures.

Appendix B.)

Balances due to Collectors, July 1, 1900.	Expenditures authorized by the Department.						Balances due by Collectors, June 30, 1901.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
....	7,244 89	6 15	290 96	....	215 45	186 80	43 98	7,988 23
.....	8,086 11	.....	..... .	50 00	480 79	379 93	.....	8,996 83
....	1,000 00	2 00	.....	....	6 85	89 00	... .	1,097 85
.....	15,154 37	.....	166 86	136 92	461 77	449 11	.....	16,369 03
.....	19,575 01	....	665 48	....	74 73	243 80	.....	20,559 02
.....	8,022 50	....	....	270 00	92 25	362 16	.....	8,746 91
....	17,675 00	17 85	619 92	80 00	148 04	319 65	.....	18,860 46
....	6,059 10	27 90	134 57	.....	37 00	262 25	.....	6,520 82
....	4,612 50	.....	... .	125 00	403 25	135 81	.....	5,276 56
.....	6,996 73	34 43	.....	133 00	156 05	213 56	.....	7,533 77
.....	3,641 11	40 64	.....	.....	58 50	340 00	.....	4,080 25
.....	1,044 62	.. . ...	....		56 85	50 22	.....	1,151 69
.....	10,263 55	22 42	100 00	....	31 30	257 15	....	10,674 42
.....	3,889 38	1 00	366 17	48 00	211 10	146 58	.....	4,662 23
.....	5,574 99	.....	.....	.....	362 80	242 73	.....	6,180 52
.....	34,183 99	7 38	904 06	69 33	570 30	509 58	.....	36,244 64
49 08	18,627 70	.....	100 00	72 00	437 35	214 34	....	19,500 47
....	6,800 90	.....	.....	150 00	1,063 88	164 30	.....	8,178 18
49 08	178,451 55	159 77	3,348 02	1,134 25	4,868 26	4,566 97	43 98	192,621 88
....	3,917 65	....	15 18	.....	116 00	128 34	.....	4,177 17
.....	38,014 81	57 95	2,267 82	.....	814 10	994 35	.....	42,149 03
. .. .	10,969 91	47 47	2,749 68	....	461 41	526 94	.....	14,695 41
.....	6,202 87	12 30	....	192 00	402 09	271 27	....	7,080 53
... .	1,000 00	..... .	....	....	8 05	17 90	... .	1,025 95
.....	3,214 43	....	183 32	96 00	228 61	248 06	.....	3,970 42
.....	1,950 00	.....	.. . .	.....	67 35	74 95	.....	2,092 30
....	1,097 03	.....	....	30 00	24 40	76 93	....	1,228 36
.....	4,600 00	... ...	.....	.....	252 13	34 63	.. ..	4,886 76
. ....	70,906 70	117 72	5,216 00	318 00	2,374 14	2,373 37	... .	81,305 93
....	7,879 13	.....	. ...	... .	82 48	214 47	.....	8,176 08
....	2,500 00	.....	....	....	436 68	15 78	.....	2,952 46
....	10,379 13	....	.....	.. ..	519 16	230 25	.....	11,128 54
....	10,710 00	.....	.....	....	150 04	251 71	.....	11,111 75
.....	1,700 00	92 24	....	.....	113 31	134 79	.....	2,040 34
.....	12,410 00	92 24	.....	....	263 35	386 50	.....	13,152 09
.....	2,200 00	.....	....	30 00	. .....	63 31	100 00	2,393 31
.....	13,071 25	.....	730 00	180 00	619 55	268 23	200 00	15,069 03
.....	2,900 00	.....	61 31	90 00	572 15	208 11	.....	3,831 57
..... .	2,500 00	.....	.....	.....	1,097 90	98 25	.....	3,696 15
.....	18,471 25	.....	791 31	270 00	2,289 60	574 59	200 00	22,596 75

1-2 EDWARD VII., A. 1902

EXCISE,

No. 4.—Collection Divisions

Dr. (*For Details, see*

Balances due by Collectors, July 1, 1900.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for				Balances due to Collectors, June 30, 1901.	Totals.	Divisions.
		Superannuation.	Insurance.	Retirement.	Guarantee.			
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
	11,312 70	30 00		366 50	43 56		11,692 76	Vancouver.
	5,132 90	109 68		15 00	20 16		5,277 74	Victoria.
	3,234 94	50 00			9 00		3,293 94	District Inspector.
	19,680 54	189 68		321 50	72 72		20,264 44	*British Columbia.*
	352 40						352 40	Chief Inspector of Inland Revenue.
	217 73						217 73	Inspector of Bonded Factories.
	3,696 75						3,696 75	General Expenditure.
	1,412 93						1,412 93	Legal Expenses.
	6,365 28						6,365 28	Printing.
	2,002 29						2,002 29	Stationery.
	695 00						695 00	Lithographing, Engraving, &c.
	11,188 19				5 76		11,193 95	Preventive Service.
	5,489 83						5,489 83	Commission to Custom Officers.
	70 78						70 78	Commission on sale of Stamps for Canada Twist.
	20,492 09						20,492 09	Tobacco Stamps.
	6,342 68						6,342 68	Duty-pay to officers in charge of most important establishments.
367 75	392,332 08	5,377 95	71 76	2,41396	1,182 07	49 08	401,794 65	Grand Totals.

Inland Revenue Department,
Ottawa, August 10, 1901.

SESSIONAL PAPER No. 12

1900–1901,

in Account with Expenditures—*Concluded.*

Appendix B.)

Balances due to Collectors, July 1, 1900.	Expenditures authorized by the Department.						Balances due by Collectors, June 30, 1901.	Totals.
	Salaries.	Seizures Expenditure.	Special Assistance	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	7,631 51	.....	1,941 27	826 00	704 55	589 43	.....	11,692 76
.....	4,421 31	.....	397 98	120 00	172 85	165 60	.....	5,277 74
.....	2,500 00	.....	.....	.....	793 94	.....	.....	3,293 94
.....	14,552 82	.....	2,339 25	946 00	1,671 34	755 03	.....	20,264 44
.....	.....	.....	.....	.....	317 40	35 00	.....	352 40
.....	.....	.....	.....	.....	179 19	38 54	.....	217 73
.....	.....	.....	.....	.....	.....	3,696 75	.....	3,696 75
.....	.....	.....	.....	.....	.....	1,412 93	.....	1,412 93
.....	.....	.....	.....	.....	.....	6,365 28	.....	6,365 28
.....	.....	.....	.....	.....	.....	2,002 29	.....	2,002 29
.....	.....	.....	.....	.....	.....	695 00	.....	695 00
.....	2,749 88	.....	6,437 70	.....	1,617 62	388 75	.....	11,193 95
.....	.....	.....	.....	.....	.....	5,489 83	.....	5,489 83
.....	.....	.....	.....	.....	.....	70 78	.....	70 78
.....	.....	.....	.....	.....	.....	20,492 09	.....	20,492 09
.....	.....	.....	.....	.....	.....	6,342 68	.....	6,342 68
49 08	310,121 33	369 73	18,132 28	2,698 25	14,100 06	55,979 94	343 98	401,794 65

W. J. GERALD,
Deputy Minister.

HYDRAULIC AND OTHER RENTS.

No. 5.—Summary Statement of Lessees' Accounts, 1900-1901.

Dr. *(For Details, see Appendix A.)* Cr.

Balances due July 1, 1900.	Accrued during the year ended June 30, 1900.	Totals.	———	Deposited to the credit of the Receiver General.	Balances due June 30, 1901.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,968 84	3,260 00	5,228 84	Chaudière Falls and Ottawa River	3,359 00	1,869 84	5,228 84
50 00	26 00	76 00	St. Lawrence River	1 00	75 00	76 00
20 00	20 00	40 00	St. Maurice River	20 00	20 00	40 00
70 00	.....	70 00	Rivière du Lièvre	.....	70 00	70 00
552 00	264 00	816 00	Sundry properties	161 00	655 00	816 00
			Land Sales.			
15,573 50	.....	15,573 50	Principal Accounts	.....	15,573 50	15,573 50
9,474 83	.....	9,474 83	Interest	.....	9,474 83	9,474 83
27,709 17	3,570 00	31,279 17		3,541 00	27,738 17	31,279 17

Inland Revenue Department,
Ottawa, August 10, 1901.

W. J. GERALD,
Deputy Minister.

DR. — No. 6.—MINOR PUBLIC WORKS, 1900-1901. — CR.

Balances due July 1, 1900.	Accrued during the year ended June 30, 1901.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due June 30, 1901.	Totals.
$ cts.	$ cts.	$ cts.	*Bridges.*	$ cts.	$ cts.	$ cts.
2,600 62	.....	2,600 62	Dunnville	.....	2,600 62	2,600 62
25 00	.....	25 00	Bridgeburg and Black Rock	25 00	.....	25 00
10 00	10 00	20 00	Bristol	20 00	.....	20 00
50 00	15 00	65 00	Buckingham and Cumberland	65 00	.....	65 00
.....	50 00	50 00	Buffalo and Point Abinot	50 00	.....	50 00
10 00	10 00	20 00	Cross Point and Campbellton	20 00	.....	20 00
20 00	.....	20 00	Edmundston and Maine	.....	20 00	20 00
50 00	50 00	100 00	Fort Erie and Buffalo	100 00	.....	100 00
.....	1 00	1 00	Gould's Landing and Portage du Fort	1 00	.....	1 00
.....	22 50	22 50	Hawkesbury and Grenville	22 50	.....	22 50
155 00	.....	155 00	Hull (new lease)	155 00	.....	155 00
1,736 79	.....	1,736 79	Hull (old lease)	.....	1,736 79	1,736 79
.....	30 00	30 00	La Passe and Gower Point	30 00	.....	30 00
.....	6 00	6 00	Montebello and Alfred	6 00	.....	6 00
50 00	50 00	100 00	Niagara and Youngstown	100 00	.....	100 00
2 00	2 00	4 00	Ottawa and Kettle Island	4 00	.....	4 00
.....	1 00	1 00	Ouellette Street, Detroit	1 00	.....	1 00
.....	5 00	5 00	Papineauville and Brown's wharf	5 00	.....	5 00
.....	202 00	202 00	Pembroke and Allumette Island (new lease)	202 00	.....	202 00
1 00	.....	1 00	Pembroke and Allumette Island (old lease)	.....	1 00	1 00
.....	200 00	200 00	Prescott and Ogdensburg	200 00	.....	200 00
.....	10 00	10 00	Queenston	10 00	.....	10 00
.....	60 00	60 00	Queenston and Lewiston	60 00	.....	60 00
159 00	159 00	318 00	Quyon	318 00	.....	318 00
.....	50 00	50 00	Rockliffe and Gatineau	.....	50 00	50 00
.....	100 00	100 00	Sault Ste. Marie	100 00	.....	100 00
30 00	.....	30 00	St. Léonard and Van Buren	.....	30 00	30 00
			Sundries.			
8,000 00	.....	8,000 00	Dundas and Waterloo Road	.....	8,000 00	8,000 00

DR. No. 6.—MINOR PUBLIC WORKS, 1900-1901—*Concluded.* CR.

Balances due July 1, 1900.	Accrued during the year ended June 30, 1901.	Totals.	Works.	Deposited to the credit of the Receiver General.	Balances due June 30, 1901.	Totals.
			Sundries—Concluded.			
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
.....	2 00	2 00	Government Telegraph Lines	2 00	.....	2 00
.....	175 00	175 00	Part of building, Portland, N.B.	175 00	.....	175 00
.....	25 00	25 00	Wiarton Docks	25 00	.....	25 00
12,899 41	1,235 50	14,134 91	Totals	1,696 50	12,438 41	14,134 91

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

No. 7.—CULLERS' REVENUE, 1900–1901.

DR. (*For Details, see Appendix A.*) CR.

Balances due July 1, 1900.	Amounts accrued for measuring and culling Timber during the year ended June 30, 1901.	Totals.	——	Deposited to the credit of the Receiver General.	Balances due June 30, 1901.	Totals.
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
37,505 65	8,270 78	45,776 43	... Quebec	8,270 78	37,505 65	45,776 43
289 77	.....	289 77	... . Plamondon, M.A.....	.....	289 77	289 77
37,795 42	8,270 78	46,066 20	.. ..Totals.....	8,270 78	37,795 42	46,066 20

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

No. 8.—CULLERS' EXPENDITURES, 1900-1901.

(*For Details, see Appendix B.*)

DR. CR.

Balances due July 1, 1900.	Received from Department to meet expenditure.	Deductions from Salaries for		Totals.	——	Authorized Expenditures.				Balances due June 30, 1901.	Totals.
		Superannuation.	Retirement.			Salaries.	Contingencies.	Cullers' Fees.	Annuities.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
75 00	7,775 64	103 96	37 44	7,992 04	....Quebec	5,950 00	1,967 04	.....	.....	75 00	7,992 04
.....	10,495 73	....	....	10,495 73	. ..Superannuated Cullers and Cullers' Fees..	....	....	4,200 00	6,295 73	....	10,495 73
....	6 05	....	.....	6 05	....Printing.....	.....	6 05	.....	.....	....	6 05
.....	29 28	.....	.....	29 28	....Stationery	.....	29 28	.....	.....	.. ..	29 28
75 00	18,306 70	103 96	37 44	18,523 10	.....Totals.	5,950 00	2,002 37	4,200 00	6,295 73	75 00	18,523 10

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

BILL STAMPS, 1900-1901.

DR. No. 9.—BILL STAMP Distributors in account with the Inland Revenue Department. CR.

BALANCES, JULY 1, 1900.		Totals.	——	BALANCES, JUNE 30, 1901.		Totals.
Stamps on hand.	Cash on hand.			Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,372 77	. . ..	1,372 77	...Post Office Department	1,372 77	....	1,372 77
... .	11 54	11 54	... Belleville, ex-Collector E. R. Benjamin.	.....	11 54	11 54
....	33 50	33 50	....Three Rivers, ex-Collector B. Lassalle	.....	33 50	33 50
160 00	.....	160 00	....McLeod, Colonel J. F., Fort McLeod.....	160 00	....	160 00
1,532 77	45 04	1,577 81	.....Totals	1,532 77	45 04	1,577 81

LAW STAMPS, 1900-1901.

DR. No. 10.—LAW STAMP Distributors in account with the Inland Revenue Department. CR.

Stamps received from Department.	Totals.	——	Commission of 5 per cent allowed by Department on Stamps sold.	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.	$ cts.
1,550 00	1,550 00	. Cameron, R., Registrar, Supreme Court.	77 50	1,472 50	1,550 00
3,846 00	3,846 00	. ..Audette, L. A., Registrar, Exchequer Court	192 30	3,653 70	3,846 00
5,396 00	5,396 00	....Totals.....	269 80	5,126 20	5,396 00

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

DR. No. 11.—SUNDRY MINOR REVENUES, 1900–1901. CR.

Accrued during the year ended June 30, 1901.	Totals.	——	Deposited to the credit of the Receiver General.	Totals.
$ cts.	$ cts.		$ cts	$ cts.
322 00	322 00	....Fertilizers Inspection Fees	322 00	322 00
211 00	211 00	....Adulteration of Food Fees..... ..	211 00	211 00
4 30	4 30	....Casual Revenue.....	4 30	4 30
537 30	537 30	.....Totals.....	537 30	537 30

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

No. 12.—SUNDRY MINOR EXPENDITURE, 1900-1901.

DR. (*For Details, see Appendix B.*) CR.

Balance due July 1, 1900.	Amounts received from Department to meet Expenditure	Deductions from Salaries for Superannuation.	Totals.	—	Balance due to Inspector July 1, 1900.	Salaries.	Contingencies.	Printing.	Stationery	Balance due June 30, 1901.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
225 81	24,881 37	110 00	25,217 18	....Adulteration of Food.....	....	10,750 00	13,660 86	267 86	240 16	298 30	25,217 18
.....	14,834 99	.....	14,834 99	....Inspection of Staples....	21 94	1,500 00	6,313 05	.....	.....	7,000 00	14,834 99
.....	91 37	.....	91 37	....Minor Public Works.....	....	.....	85 70	5 67	.. . .	....	91 37
225 81	39,807 73	110 00	40,143 54	.....Totals.....	21 94	12,250 00	20,059 61	273 53	240 16	7,298 30	40,143 54

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

No. 13.—STATEMENT showing the quantities of the several articles subject to 1899, 1900 and 1901, and

ARTICLES SUBJECT TO EXCISE DUTY.	1899.			
	QUANTITIES.			Duty.
	Ex-Manufactory.	Ex-Warehouse.	Total.	
	Gallons.	Gallons.	Gallons.	$ cts.
Spirits	5,571	2,404,599	2,410,170	4,566,147 06
	Imported.	*137,825	137,825	41,347 41
Totals	5,571	2,542,424	2,547,995	4,607,454 47
Malt Liquor, the duty being paid on malt	21,101,873		21,101,873	57 00
	Lbs.	Lbs.	Lbs.	
Malt	19,121	46,193,701	46,212,822	843,193 34
Cigars—	No.	No.	No.	
Foreign	71,664,873	55,577,730	127,242,603	763,467 25
Canadian	775,750	245,900	1,021,650	3,064 95
Combination	524,845	130,000	654,845	1,964 54
Totals	72,965,468	55,953,630	128,919,098	768,496 74
Cigarettes—				
Foreign	100,609,828	141,000	100,750,828	302,252 49
Canadian		392,500	392,500	588 75
Combination				
Totals	100,609,828	533,500	101,143,328	302,841 24
	Lbs.	Lbs.	Lbs.	
Tobacco from Foreign Leaf	719,987	6,385,800	7,105,787	1,776,457 27
" Canadian Leaf	1,564,167	622,260	2,186,427	109,321 37
" Combination Leaf	263,906	88,299	352,205	17,610 28
Snuff	218,225		218,225	39,700 85
Canadian Twist		84,115	84,115	4,205 76
Totals	2,766,285	7,180,474	9,946,759	2,250,136 77
Raw Leaf Tobocco, Foreign		10,239,863	10,239,863	1,067,656 40
Total Duties on Tobacco and Cigarettes				3,317,793 17
Inspection Fees on Petroleum				46,059 81
Vinegar				31,594 41
Acetic Acid				15,977 91
Licenses, Spirits				2,125 00
" Malt Liquor				6,750 00
" Malt				6,275 00
" Cigars				12,822 50
" Tobacco				2,375 00
" Vinegar				1,900 00
" Acetic Acid				100 00
" Petroleum				
				9,663,014 35

* Spirits imported for use in the manufacture of crude fulminate, on which duty at the rate of 30

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

Excise Duty taken for Consumption, during the years ended June 30, the Duty accrued thereon.

1900.				1901.			
Quantities.			Duty.	Quantities.			Duty.
Ex-Manufactory.	Ex-Warehouse.	Total.		Ex-Manufactory.	Ex-Warehouse.	Total.	
Gallons.	Gallons.	Gallons.	$ cts.	Gallons.	Gallons.	Gallons.	$ cts.
493	2,523,576	2,524,069	4,778,352 20	914	2,707,919	2,708,833	5,131,739 99
Imported.	*134,969	134,969	40,490 72	Imported.	*155,117	155,117	46,535 13
493	2,658,545	2,659,038	4,818,842 92	914	2,863,036	2,863,950	5,178,275 12
23,309,172	....	23,309,172	498 90	25,108,254	.....	25,108,254	68 90
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
.... ..	60,284,064	60,284,064	904,262 81	1,104	64,722,512	64,723,616	970,855 15
No.	No.	No.		No.	No.	No.	
70,653,362	61,799,185	132,492,547	794,965 41	71,874,913	61,272,370	133,147,283	798,889 88
1,256,590	429,550	1,686,140	5,058 42	1,942,666	166,300	2,108,966	6,326 89
2,534,520	1,328,500	3,863,020	11,589 06	3,472,940	2,367,700	5,840,640	17,521 92
74,484,472	63,557,235	138,041,707	811,612 89	77,290,519	63,806,370	141,096,889	822,738 69
113,256,372	2,184,050	115,440,422	346,321 26	119,343,584	1,024,000	120,367,584	361,102 75
349,000	200,000	549,000	823 50	....	275,000	275,000	412 50
72,100	....	72,100	108 15	741,000	.....	741,000	1,111 50
113,677,472	2,384,050	116,061,522	347,252 91	120,084,584	1,299,000	121,383,584	362,626 75
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	
644,818	6,303,787	6,948,605	1,737,151 40	592,597½	6,171,934½	6,764,532	1,691,133 43
1,782,442	680,933	2,463,375	123,168 86	2,624,181½	482 480½	3,106,662	155,333 23
528,327	597,896	1,126,223	56,311 26	557,346½	644,413	1,201,759½	60,088 10
219,337	400	219,737	40,031 25	199,795	.....	199,795	36,399 20
.. ..	58,914	58,914	2,945 70	.....	57,597	57,597	2,879 85
3,174,924	7,641,930	10,816,854	2,306,861 38	3,973,920½	7,356,425	11,330,345½	2,308,460 56
.. ..	9,352,535	9,352,535	971,977 60	.....	9,848,803¾	9,848,803¾	1,026,265 72
.....	.. .. ..	.....	3,278,838 98	.....	.....	.....	3,334.726 28
.....	.....	.....	5,502 71	.....	... .	.....	.....
.....	.....	.....	28,192 25	.....	... .	.....	42,067 16
.....	.....	.....	9,546 96	.....	.....	... .	8,809 62
.....	.....	.....	2,375 00	.....	.....	.....	2,500 00
.....	.....	.....	6,675 00	.....	.....	.....	6,500 00
.....	.....	.....	6,275 00	.....	.....	.....	6,475 00
.....	.....	.....	14,036 00	.....	.....	.....	14,695 00
.....	.....	.....	2,800 50	.....	.....	.....	3,122 00
.....	.....	.....	2,000 00	.....	.....	.....	2,175 00
.....	.....	.....	100 00	.....	.....	.....	100 00
.....	.....	.....	2 06	.....	.....	.....	1 00
.....	.....	.....	9,891,555 92	....	.....	.....	10,393,108 92

cents per gallon was collected and afterwards refunded, on the exportation of the fulminate.

W. J. GERALD,
Deputy Minister.

No. 14.—Amounts deposited monthly to the credit of the Honourable the Receiver General on account of Inland Revenues, during the Fiscal Year ended June 30, 1900–1901.

	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North-west Territories.	British Columbia.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
July :—								
Excise	298,281 90	323,150 26	21,245 28	17,225 48	3,921 85	40,163 42	32,029 76	736,017 95
" Seizures	60 00	397 40						457 40
Culling Timber		345 74						345 74
Hydraulic Rents		20 00					25 00	45 00
Minor Public Works	10 00		10 00					20 00
Weights and Measures	1,015 95	1,621 50	25 47	72 00	4 00			2,738 92
" " Seizures	20 00							20 00
Gas Inspection	615 50	57 50		91 25			15 00	779 25
Electric Light Inspection	59 50	52 50		4 25			68 25	184 50
Methylated Spirits	2,455 03	1,500 97		45 27				4,001 27
Other Revenues	2,449 00	635 00	100 00	230 00	60 00	190 00	275 00	3,939 00
Totals	304,966 88	327,780 87	21,380 75	17,668 25	3,985 85	40,353 42	32,413 01	748,549 03
August :—								
Excise	335,414 82	355,462 72	19,960 32	17,957 31	4,069 94	42,089 22	43,757 71	818,712 04
" Seizures	98 48	163 10						261 58
Culling Timber		2,878 32						2,878 32
Hydraulic Rents							25 00	25 00
Minor Public Works	180 00	159 00						339 00
Weights and Measures	1,552 09	2,084 01	286 58	149 67	30 18	677 92	50 75	4,831 20
Gas Inspection	1,047 25	540 00	20 00	45 25	9 50	11 75	54 00	1,727 75
Electric Light Inspection	200 25	207 50	93 25	28 75			25 75	555 50
Methylated Spirits	3,739 48	1,906 15	42 55	264 62				5,952 80
Other Revenues	693 20	110 00	85 00	85 00		25 00		998 20
Totals	342,925 57	363,510 80	20,487 70	18,530 60	4,109 62	42,803 89	43,913 21	836,281 39
September :—								
Excise	374,583 72	365,520 43	22,459 98	20,433 03	4,507 35	42,738 85	47,571 86	877,815 22
" Seizures	7 50	22 45						29 95
Culling Timber		1,245 28						1,245 28
Minor Public Works	50 00		43 75					93 75
Weights and Measures	1,997 69	2,169 55	171 70	309 57	86 66	676 57	33 25	5,444 99
Gas Inspection	975 25	452 80	19 00	42 75	5 25	32 00	31 00	1,558 05
Electric Light Inspection	420 75	122 25		56 25			37 00	636 25
Methylated Spirits	3,659 83	2,236 12					66 04	5,961 99
Other Revenues	676 00		10 00					686 00
Totals	382,370 74	371,768 88	22,704 43	20,841 60	4,599 26	43,447 42	47,739 15	893,471 48

OCTOBER :—								
Excise	400,064 33	412,987 76	23,690 07	21,479 38	4,578 01	67,898 35	46,389 34	977,087 24
" Seizures	50 00	11 75						61 75
Culling Timber		275 53						275 53
Hydraulic Rents	201 00	4 00	5 00				11 00	221 00
Minor Public Works	5 00						1 00	6 00
Weights and Measures	4,655 29	1,039 29	145 87	141 29	54 78	356 37	107 25	6,500 14
" " Seizures	15 00							15 00
Gas Inspection	1,054 00	511 25	9 50	55 50	18 25	46 00	33 00	1,727 50
Electric Light Inspection	253 25	281 50	24 75	2 25		7 00	47 00	615 75
Methylated Spirits	4,379 33	2,845 21		103 31		94 38	62 18	7,484 41
Other Revenues	518 70			6 00		5 00		529 70
Totals	411,195 90	417,956 29	23,875 19	21,787 73	4,651 04	68,407 10	46,650 77	994,524 02
NOVEMBER :—								
Excise	401,572 30	424,680 90	24,864 91	23,810 90	4,098 84	59,128 27	39,265 72	977,421 84
" Seizures	64 00							64 00
Culling Timber		204 08						204 08
Hydraulic Rents	560 00			5 00			12 00	577 00
Minor Public Works	50 00		43 75					93 75
Weights and Measures	1,885 32	1,036 86	148 57	99 74	12 48	664 64	2 00	3,849 61
Gas Inspection	1,150 50	639 75	11 00	35 25	4 00	18 00	4 50	1,863 00
Electric Light Inspection	369 75	439 75	36 50	18 00		103 75	133 50	1,101 25
Methylated Spirits	3,829 81	2,301 60	61 27	143 83		136 09		6,472 60
Other Revenues	207 10	4 30						211 40
Totals	409,688 78	429,307 24	25,166 00	24,112 72	4,115 32	60,050 75	39,417 72	991,858 53
DECEMBER :—								
Excise	387,103 83	478,217 63	23,033 40	28,591 69	4,826 67	52,086 02	36,138 55	1,009,997 79
" Seizures	10 00							10 00
Hydraulic Rents	1 00			1 00				2 00
Minor Public Works	7 50	50 00						57 50
Weights and Measures	1,888 33	585 80	63 35	172 04	6 50	368 64	15 55	3,100 21
Gas Inspection	1,375 50	471 00	16 50	24 25	3 00	72 75	52 50	2,015 50
Electric Light Inspection	371 25	463 25	23 50	33 00		75 75	117 00	1,083 75
Methylated Spirits	3,169 66	1,527 43	187 89				69 16	4,954 14
Other Revenues	224 50	20 00						244 50
Totals	394,151 57	481,335 11	23,324 64	28,821 98	4,836 17	52,603 16	36,392 76	1,021,465 39
JANUARY :—								
Excise	343,194 25	315,177 34	19,712 31	20,888 25	4,312 04	42,270 58	35,238 72	780,793 49
" Seizures		125 00						125 00
Hydraulic Rents	350 00							350 00
Minor Public Works	75 00							75 00
Weights and Measures	3,452 55	616 45	141 85	39 57	13 80	330 75	26 55	4,621 52
Gas Inspection	1,137 50	385 50	70 00	63 50	16 00	40 75	39 50	1,752 75
Electric Light Inspection	350 50	230 75	23 75	27 75		101 77	110 00	844 52
Methylated Spirits	3,831 04	1,774 94	45 32					5,651 30
Other Revenues	597 20	30 00	13 00					640 20
Totals	352,988 04	318,339 98	20,006 23	21,019 07	4,341 84	42,743 85	35,414 77	794,853 78

No. 14.—AMOUNTS deposited monthly to the credit of the Honourable the Receiver General, &c.—*Concluded.*

	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Manitoba and North-west Territories.	British Columbia.	Totals.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
FEBRUARY :—								
Excise	320,470 62	343,967 07	17,129 47	14,911 79	4,292 20	35,183 24	35,519 90	771,474 29
Culling Timber		695 34						695 34
Hydraulic Rents	1,100 00							1,100 00
Minor Public Works			43 75					43 75
Weights and Measures	1,603 92	784 60	42 55	35 90	9 10	232 75	2 35	2,711 17
Gas Inspection	1,238 00	304 25	15 50		7 00	29 50	9 50	1,603 75
Electric Light Inspection	376 50	453 25	73 25	43 25		45 75	93 00	1,085 00
Methylated Spirits	3,005 63	1,927 45		106 76		88 40		5,128 24
Other Revenues	513 75		6 00					519 75
Totals	328,308 42	348,131 96	17,310 52	15,097 70	4,308 30	35,579 64	35,624 75	784,361 29
MARCH :—								
Excise	363,004 63	354,665 50	18,601 75	18,364 99	4,139 85	45,256 71	34,399 30	838,432 73
" Seizures	3 56	14 80						18 36
Culling Timber		10 44						10 44
Hydraulic Rents	475 00	2 00						477 00
Minor Public Works	1 00							1 00
Weights and Measures	1,887 57	885 35	36 90	28 55	15 73	189 70	28 15	3,071 95
Gas Inspection	1,283 75	271 25	13 00	25 25	3 00	69 00	48 00	1,713 25
Electric Light Inspection	361 25	394 25	79 50	44 25			86 25	965 50
Methylated Spirits	3,730 15	2,408 44	43 73	346 30				6,528 62
Other Revenues	476 25	8 00	20 00	21 00			18 00	543 25
Totals	371,223 16	358,660 03	18,794 88	18,830 34	4,158 58	45,515 41	34,579 70	851,762 10
APRIL :—								
Excise	333,813 07	380,875 24	17,144 43	17,711 55	4,494 46	49,594 19	39,342 27	842,975 21
" Seizures		10 00						10 00
Hydraulic Rents	1 00	2 00		16 00			1 00	20 00
Minor Public Works		35 00						35 00
Weights and Measures	2,932 82	1,424 70	54 75	96 71	16 25	340 35	20 40	4,885 98
Gas Inspection	1,283 00	526 00	87 25	55 25	10 75	40 50	162 25	2,165 00
Electric Light Inspection	403 75	389 00	76 50	47 00		14 00	164 50	1,094 75
Methylated Spirits	4,352 35	3,268 66	102 92	104 11		90 64		7,918 68
Other Revenues	818 50	37 50	2 00	20 00	6 00			884 00
Totals	343,604 49	386,568 10	17,467 85	18,050 62	4,527 46	50,079 68	39,690 42	859,988 62

MAY :—								
Excise	391,941 19	390,403 55	20,865 56	21,350 44	4,474 70	42,791 02	36,032 85	907,859 31
" Seizures		110 00						110 00
Culling Timber		496 93						496 93
Hydraulic Rents	1 00						1 00	2 00
Minor Public Works	649 00	30 00	43 75					722 75
Weights and Measures	2,053 19	1,748 22	89 60	52 35	24 50	208 05	18 15	4,194 06
Gas Inspection	1,196 25	646 00	27 50	59 25	2 25	34 50	55 75	2,021 50
Electric Light Inspection	283 50	292 50	43 75	51 00		50 50	154 25	875 50
Methylated Spirits	4,008 17	2,465 99					67 15	6,541 31
Other Revenues	422 75		4 00					426 75
Totals	400,555 05	396,193 19	21,074 16	21,513 04	4,501 45	43,084 07	36,329 15	923,250 11
JUNE :—								
Excise	357,857 07	360,115 54	24,419 49	21,233 55	5,299 61	60,564 46	57,239 88	886,729 60
" Seizures		143 65						143 65
Culling Timber		2,119 12						2,119 12
Hydraulic Rents	671 00	1 00					50 00	722 00
Minor Public Works	50 00	159 00						209 00
Weights and Measures	5,297 57	2,122 77	206 30	458 15	53 52	171 70	90 80	8,400 81
Gas Inspection	1,833 75	1,111 75	132 75	21 25	9 00	81 25	56 50	3,246 25
Electric Light Inspection	505 00	852 75	88 00	17 00		30 25	30 25	1,523 25
Other Revenues	726 25	72 00		2 00		18 00	19 00	838 25
Methylated Spirits	3,851 54	2,495 63	353 28	379 67				7,080 12
Totals	370,792 18	369,193 21	25,199 82	22,112 62	5,362 13	60,865 66	57,486 43	911,012 05
Grand Totals	4,412,770 78	4,568,745 66	256,792 17	248,386 27	53,497 02	585,534 05	485,651 84	10,611,377 79

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

EXCISE

No. 15.—Comparative Monthly

——	July.	August.	September.	October.	November.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Spirits.... 1899-1900....	326,550 12	372,100 70	428,091 37	459,315 58	449,707 03
1900-1901....	361,460 24	402,425 25	435,297 96	481,928 82	510,226 61
Increase, 1900-1901	34,910 12	30,324 55	7,206 59	22,613 24	60,519 58
Decrease, 1900-1901					
Malt Liquors.... 1899-1900....	6,100 00	50 00	60 00	250 00	266 40
1900-1901....	5,850 00	150 00	200 00	100 00	50 00
Increase, 1900-1901		100 00	140 00		
Decrease, 1900-1901	250 00			150 00	216 40
Malt.... 1899-1900....	52,527 77	59,702 91	67,879 91	77,437 07	83,490 61
1900-1901....	64,501 88	70,212 25	75,743 28	89,622 72	82,803 61
Increase, 1900-1901	11,974 11	10,509 34	7,863 37	12,185 65	
Decrease, 1900-1901					687 00
Tobacco.... 1899-1900....	247,259 05	253,987 06	310,946 07	320,103 90	315,955 10
1900-1901....	268,257 78	296,948 65	274,512 96	321,780 16	309,395 80
Increase, 1900-1901	20,998 73	42,961 59		1,676 26	
Decrease, 1900-1901			36,433 11		6,559 30
Cigars.... 1899-1900....	80,504 35	73,254 60	68,620 39	69,108 99	70,033 64
1900-1901....	83,391 89	76,159 01	69,003 54	75,674 58	68,921 15
Increase, 1900-1901	2,887 54	2,904 41	383 15	6,565 59	
Decrease, 1900-1901					1,112 49
Petroleum.... 1899-1900....	2,103 15	3,109 66	235 70	40 00	
1900-1901....					
Increase, 1900-1901					
Decrease, 1900-1901	2,103 15	3,109 66	235 70	40 00	
Acetic Acid.... 1899-1900....	1,173 77	200 77	263 87	303 95	428 39
1900 1901....	107 69	419 94	576 18	2,340 81	3,068 57
Increase, 1900-1901		219 17	312 31	2,036 86	2,640 18
Decrease, 1900-1901	1,066 68				
Manufactures in bond. 1899-1900....	2,469 76	2,933 59	3,499 38	3,710 99	2,518 41
1900-1901....	3,427 34	5,633 38	6,383 94	5,213 65	3,251 94
Increase, 1900-1901	957 58	2,699 79	2,884 56	1,502 66	733 53
Decrease, 1900-1901					
Seizures.... 1899 1900....	367 15	409 74	622 67	770 30	633 46
1900-1901....	607 40	111 58	91 70		64 00
Increase, 1900-1901	240 25				
Decrease, 1900-1901		298 16	530 97	770 30	569 46
Other receipts.... 1899-1900....	10,928 16	1,362 50	1,406 50	1,157 00	1,308 38
1900-1901....	11,407 84	1,477 79	720 35	2,030 32	1,701 97
Increase, 1900-1901	479 68	115 29		873 32	392 59
Decrease, 1900-1901			686 15		
Total Increase, 1900-1901	69,028 78	86,426 32		46,493 28	55,142 23
Total Decrease, 1900-1901			19,095 95		
Total Revenue, 1899-1900	729,983 28	767,111 53	881,625 86	932,197 78	924,341 42
" 1900-1901	799,012 06	853,537 85	862,529 91	978,691 06	979,483 65

Inland Revenue Department, Ottawa, August 10, 1901.

SESSIONAL PAPER No. 12

REVENUE.

Statement, 1899–1900 and 1900–1901.

December.	January.	February.	March.	April.	May.	June.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
542,297 33	372,916 64	348,828 31	463,875 40	338,130 49	365,080 72	354,324 23	4,821,217 92
606,778 19	388,089 75	402,410 09	367,272 93	411,473 53	417,080 79	396,330 96	5,180,775 12
64,480 86	15,173 11	53,581 78	.....	73,343 04	52,000 07	42,006 73	359,557 20
.....	.....	.....	96,602 47	.....	.....	.....	.....
50 00	105 00	189 50	.....	25 00	.....	78 00	7,173 90
50 00	68 50	50 00	.....	13 70	.....	36 70	6,568 90
.....	.....	.....	.....	.....	.....	.....	.....
.....	36 50	139 50	.....	11 30	.....	41 30	605 00
77,223 23	73,611 86	69,919 05	119,673 31	69,597 98	75,695 08	83,779 03	910,537 81
88,133 59	82,493 39	71,052 68	97,349 63	84,397 93	89,148 94	81,870 25	977,330 15
10,910 36	8,881 53	1,133 63	.....	14,799 95	13,453 86	.....	66,792 34
.....	.....	.....	22,323 68	.....	.....	1,908 78	.....
227,361 81	252,094 91	236,653 67	277,312 79	290,106 14	298,852 07	251,006 91	3,281,639 48
228,776 74	251,383 61	249,619 99	283,015 24	298,461 82	298,090 22	257,605 31	3,337,848 28
1,414 93	.....	12,966 32	5,702 45	8,355 68	.....	6,598 40	56,208 80
.....	711 30	.....	.....	.....	761 85	.....	.....
70,461 05	55,527 62	57,080 64	62,392 06	64,958 94	76,772 50	76,928 11	825,642 89
66,833 68	57,127 84	56,851 05	62,746 82	71,975 37	76,396 05	72,352 71	837,433 69
.....	1,600 22	.....	354 76	7,016 43	.....	.....	11,790 80
3,627 37	.....	229 59	.....	.....	376 45	4,575 40	.....
.....	.....	.....	.....	16 20	.....	.....	5,504 71
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	16 20	.....	.....	5,504 71
1,289 69	2,759 03	586 62	.....	.....	1,656 89	983 98	9,646 96
801 15	39 97	281 63	.....	105 87	192 76	975 05	8,902 62
.....	.....	.....	.....	105 17	.....	.....	.....
488 54	2,719 06	304 99	.....	.....	1,464 13	8 93	744 34
3,054 98	829 05	859 39	1,989 32	2,187 61	2,910 72	3,229 05	30,192 25
2,164 06	1,599 30	1,393 64	3,529 09	3,441 89	4,295 21	3,908 72	44,242 16
.....	770 25	534 25	1,539 77	1,254 28	1,384 49	679 67	14,049 91
890 92	.....	.....	.....	.....	.....	.....	.....
445 56	460 45	251 00	609 33	173 86	487 82	839 80	6,071 14
.....	100 00	38 56	14 80	10 00	115 70	137 95	1,291 69
.....	.....	.....	.....	.....	.....	.....	.....
445 56	360 45	212 44	594 53	163 86	372 12	701 85	4,779 45
1,679 59	1,522 76	1,035 00	918 25	759 00	1,246 24	1,161 70	24,485 08
1,717 50	1,796 19	1,785 41	1,323 62	1,514 16	1,875 50	2,114 35	29,465 00
37 91	273 43	750 41	405 37	755 16	629 26	952 65	.....
.....	.....	.....	.....	.....	.....	.....	4,979 92
71,391 67	22,871 23	68,079 87	.....	105,439 05	64,493 13	43,001 19	501,752 47
.....	.....	.....	111,518 33	.....	.....	.....	.....
923,863 24	759,827 32	715,403 18	926,770 46	765,955 22	822,702 04	772,330 81	9,922,112 14
995,254 91	782,698 55	783,483 05	815,252 13	871,394 27	887,195 17	815,332 00	10,423,864 61

W. J. GERALD, *Deputy Minister.*

No. 16.—Refunds of Revenue during the Fiscal Year ended June 30, 1901.

EXCISE.

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1900.			$ cts.	$ cts
Spirits	Swift, E. G	July 25	Windsor	Refunded under Revised Statutes, cap. 34, sec. 238	352 71	
	Gooderham, W. G	Aug. 9	Toronto	" " 34 " 238	66 61	
	Swift, E. G	" 11	Windsor	" " 34 " 238	260 29	
	"	" 14	"	" " 34 " 238	29 26	
	"	" 30	"	" " 34 " 238	208 50	
	"	Sept. 5	"	" " 34 " 238	72 09	
	"	" 27	"	" " 34 " 238	343 16	
	"	Oct. 2	"	" " 34 " 238	28 98	
	"	" 2	"	" " 34 " 238	45 39	
	"	" 2	"	" " 34 " 238	40 60	
	"	" 19	"	" " 34 " 238	178 34	
	Heney, J. J	" 19	Prescott	" " 34 " 238	11,723 75	
	Swift, E. G	Nov. 5	Windsor	" " 34 " 238	205 07	
	Howard, A. L	" 12	Sherbrooke	" " 34 " 238	3,435 49	
	Swift, E. G	" 23	Windsor	" " 34 " 238	215 88	
	Bolmer, J. E	" 30	"	" " 34 " 238	514 77	
	Swift, E. G	Dec. 10	"	" " 34 " 238	225 76	
	"	" 20	"	" " 34 " 238	67 70	
	"	" 21	"	" " 34 " 238	66 18	
		1901.				
	"	Jan. 3	"	" " 34 " 238	199 29	
	"	" 9	"	" " 34 " 238	68 72	
	"	" 26	"	" " 34 " 238	199 58	
	"	Feb. 13	"	" " 34 " 238	154 34	
	"	" 21	"	" " 34 " 238	446 10	
	"	" 27	"	" " 34 " 238	122 59	
	"	Mar. 1	"	" " 34 " 238	38 49	
	"	" 12	"	" " 34 " 238	95 85	
	"	" 14	"	" " 34 " 238	8 70	
	"	" 20	"	" " 34 " 238	146 20	
	"	" 22	"	" " 34 " 238	98 88	
	"	" 25	"	" " 34 " 238	77 99	
	Hiram Walker & Sons	" 28	"	" " 34 " 238	11 55	

	Swift, E. G	April	9	"	"	"	34	"	238	26 22		
	Hamilton, J. S., & Co	"	12	Brantford	"	"	34	"	238	146 90		
	Swift, E. G	"	16	Windsor	"	"	34	"	238	106 21		
	"	"	23	"	"	"	34	"	238	175 56		
	"	"	28	"	"	"	34	"	238	94 72		
	Heney, J. J	May	1	Prescott	"	"	34	"	238	11,517 07		
	Swift, E. G	"	2	Windsor	"	"	34	"	238	222 30		
	"	"	10	"	"	"	34	"	238	100 91		
	Heney, J. J	"	14	Prescott	"	"	34	"	238	11,540 44		
	Swift, E. G	"	21	Windsor	"	"	34	"	238	50 98		
	"	"	23	"	"	"	34	"	238	166 55		
	Hamilton, J. S., & Co	"	27	Brantford	"	"	34	"	238	67 62		
	Hiram Walker & Sons	May	22	Windsor	"	"	34	"	238	3 02		
	Swift, E. G	"	29	"	"	"	34	"	238	321 52		
	"	June	6	"	"	"	34	"	238	64 73		
	Howard, G. W	"	8	"	"	"	34	"	238	7,070 17		
	Swift, E. G	"	13	"	"	"	34	"	238	134 94		
	Canadian Pacific Ry	"	17	"	"	"	34	"	238	116 77		
	Bolmer, J. E	"	19	"	"	"	34	"	238	733 44		
	Swift, E. G	"	25	"	"	"	34	"	238	66 84		
	"	July	6	"	"	"	34	"	238	221 73		
											52,697 45	
		1900.										
Malt	Grant & Lottridge B. Co.	July	25	Hamilton	"	"	29	"	78	344 91		
	Gooderham	Aug.	4	Toronto	"	"	29	"	78	463 65		
	Carling, T. H	"	4	London	"	"	29	"	78	1,869 58		
	Roy, J. A	"	22	Belleville	"	"	29	"	78	217 68		
	Otterbein, C	"	22	Brantford	"	"	29	"	78	129 53		
	Luke, C	"	22	"	"	"	29	"	78	108 18		
	Bixel, A. A	"	22	"	"	"	29	"	78	374 32		
	Muller, Jas	"	22	Vancouver	"	"	29	"	78	206 23		
	Bernhardt, P	"	22	Guelph	"	"	29	"	78	174 77		
	Huether, C. N	"	22	"	"	"	29	"	78	192 78		
	Bauer, A	"	22	"	"	"	29	"	78	650 17		
	Rau, Mary	"	22	"	"	"	29	"	78	210 38		
	Holliday, Thomas	"	22	"	"	"	29	"	78	423 24		
	Sherman, G	"	22	"	"	"	29	"	78	1,649 50		
	Lutz, W. H	"	22	"	"	"	29	"	78	82 70		
	Haldke, E	"	22	"	"	"	29	"	78	3 90		
	Seagram, J. E	"	22	"	"	"	29	"	78	142 50		
	Grant & Lottridge B. Co.	"	22	Hamilton	"	"	29	"	78	814 78		
	Wilson, M. G	"	22	"	"	"	29	"	78	1,543 17		
	Steele, J. J	"	22	"	"	"	29	"	78	270 97		
	Clark, L. H	"	22	Kingston	"	"	29	"	78	2,590 60		
	Fisher, J	"	22	"	"	"	29	"	78	148 74		
	Stevenson, Thos	"	22	"	"	"	29	"	78	70 72		
	Labatt, John	"	22	London	"	"	29	"	78	1,073 50		
	O'Dwyer, P. O	"	22	"	"	"	29	"	78	253 50		
	Rudolph, Henry	"	22	"	"	"	29	"	78	45 45		

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1900.			$ cts.	$ cts.
Malt—*Con.*	Capital Brewing Co., The	Aug. 22	Ottawa	Refunded under Revised Statutes, cap. 29, sec. 78	71 06	
	Eaton, Chas.	" 22	Owen Sound	" " 29 " 78	262 33	
	Schwan, W.	" 22	"	" " 29 " 78	146 33	
	Farquharson & Grainger	" 22	"	" " 29 " 78	101 32	
	Schwartz, J. S.	" 22	"	" " 29 " 78	121 61	
	Hueter, W.	" 22	"	" " 29 " 78	156 60	
	Schwan, David	" 22	"	" " 29 " 78	18 30	
	Calcutt, Henry	" 22	Peterborough	" " 29 " 78	226 10	
	Woodhouse, J. A.	" 22	"	" " 29 " 78	325 61	
	Labatt, G. T.	" 22	Prescott	" " 29 " 78	244 37	
	McCarthy, D. J.	" 22	"	" " 29 " 78	553 75	
	Bowie, R.	" 22	"	" " 29 " 78	235 60	
	Wiser, J. P.	" 22	"	" " 29 " 78	135 94	
	Taylor, H. J.	" 22	St. Catharines	" " 29 " 78	517 84	
	Cronmiller & White	" 22	"	" " 29 " 78	213 97	
	Clark, L. H.	" 22	Kingston	" " 29 " 78	875 38	
	Martini, Jos.	" 22	Stratford	" " 29 " 78	46 91	
	Devlin, F.	" 22	"	" " 29 " 78	78 52	
	Kuntz, Jacob.	" 22	"	" " 29 " 78	65 25	
	Watson, J.	" 22	"	" " 29 " 78	129 75	
	Brain, E.	" 22	Toronto	" " 29 " 78	150 67	
	Ross, W.	" 22	"	" " 29 " 78	1,960 90	
	O'Keefe, Eugène	" 22	"	" " 29 " 78	1,767 33	
	Toronto B. and M. Co.	" 22	"	" " 29 " 78	726 15	
	Simpson, T. W.	" 22	"	" " 29 " 78	120 22	
	Anderton & Co.	" 22	"	" " 29 " 78	109 53	
	Orillia B. Co., The	" 22	"	" " 29 " 78	45 39	
	Cosgrove, L. J.	" 22	"	" " 29 " 78	796 91	
	Thomas, W. J.	" 22	"	" " 29 " 78	2,407 74	
	Reinhardt, L.	" 22	"	" " 29 " 78	1,349 98	
	Irion, A. L.	" 22	Windsor	" " 29 " 78	453 75	
	Walkerville B. Co., Ltd	" 22	"	" " 29 " 78	22 50	
	Hiram Walker & Sons, Ltd.	" 22	"	" " 29 " 78	1,076 40	
	Dawes, A. J.	" 22	Montreal	" " 29 " 78	2,029 40	
	Cloutier, D.	" 22	"	" " 29 " 78	14 36	
	Dow, W., & Co.	" 22	"	" " 29 " 78	2,653 32	

Clarke, E. L.	"	22..	"	"	"	29	"	78....	519	99
Barton, F	"	22..	"	"	"	29	"	78....	49	50
Reinhardt, C. S.	"	22..	"	"	"	29	"	78 ...	421	95
Proteau & Carignan	"	22..	Quebec	"	"	29	"	78....	207	90
Amyot & Gauvin	"	22..	"	"	"	29	"	78....	606	00
Boswell Bros	"	22 ..	"	"	"	29	"	78 ...	1,055	84
Nutter, C. S	"	24..	Sherbrooke..	"	"	29	"	78...	631	53
Ready, Jas	"	24..	St. John, N.B...	"	"	29	"	78 ...	603	72
Wickwire, W. N	"	24..	Halifax.	"	"	29	"	78....	1,049	49
May, J. P	"	24..	"	"	"	29	"	78....	219	00
Curren, A. E	"	24..	"	"	"	29	"	78....	197	79
Oland, J. C.	"	24..	"	"	"	29	"	78....	340	22
"	"	24..	"	"	"	29	"	78....	90	99
Shea, P.	"	24..	Winnipeg	"	"	29	"	78....	352	27
Blackwood, W	"	24..	"	"	"	29	"	78 ...	152	37
Drewry, E. L.	"	24..	"	"	"	29	"	78....	832	99
Witteman, M.	"	24..	"	"	"	29	"	78....	26	24
Woodman, C..	"	24..	"	"	"	29	"	78....	1	50
Newmeyer, Jas	"	24..	Winnipeg	"	"	29	"	78....	7	03
Schwartz, W	"	24..	"	"	"	29	"	78...	77	73
Cross, A. E.	"	24..	Calgary	"	"	29	"	78....	297	90
Oshmer, R	"	24..	"	"	"	29	"	78....	54	55
Kelly & Omand	"	24..	"	"	"	29	"	78....	4	16
Victoria Phœnix Brewing Co.	"	24..	Victoria	"	"	29	"	78 ...	360	00
Union Brewing Co	"	24..	"	"	"	29	"	78....	150	00
Sleeman, G	Sept.	1..	Guelph	"	"	29	"	78...	286	62
Walkerville Brewing Co., Ltd	Oct.	4..	Windsor.	"	"	34	"	78....	16	82
May, J. P	"	4..	Halifax.	"	"	34	"	238....	19	26
Curren, A. E.	"	4..	"	"	"	34	"	238....	29	94
Victoria Phœnix Brewing Co.	"	4..	Victoria	"	"	34	"	238....	525	02
Wickwire, W. N	"	4..	Halifax.	"	"	34	"	238....	963	17
Culbert, Henry	"	10..	"	"	"	29	"	78....	31	02
Beauport Brewing Co., Ltd.	"	12..	Quebec.	"	"	29	"	78...	360	00
Wilson, D. H.	"	20..	Toronto	"	"	34	"	178....	244	24
	1901.									
Victoria Phœnix Brewing Co	Jan.	5..	Victoria	"	"	34	"	238....	528	48
May, J. P	"	5..	Halifax...	"	"	34	"	238....	67	78
Wickwire, W N	"	5..	"	"	"	34	"	238....	864	39
Curren, A. E...	"	5..	"	"	"	34	"	238....	63	83
Walkerville Brewing Co., Ltd	"	5..	Windsor.	"	"	34	"	178....	21	17
Wilson, D. H.	"	11..	Toronto	"	"	34	"	178 ...	187	80
Brain, E.	Feb.	7..	"	"	"	29	"	78....	61	16
Williams & Baker.	"	14..	"	"	"	29	"	78 ...	94	40
Huether, C. N.	Mar.	25..	Guelph	"	"	29	"	78....	407	79

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1901.			$ cts.	$ cts.
Malt—*Con.*	Carling, T. H.	Apr. 12..	London	Refunded under Revised Statutes, cap. 34, sec. 178....	3 33	
	Walkerville Brewing Co., Ltd	" 12..	Windsor	" " 34 " 178....	1 89	
	Wickwire, W. N	" 12..	Halifax	" " 34 " 178....	811 41	
	Curren, A. E.	" 12..	"	" " 34 " 178...	138 33	
	May, J. P	" 12..	"	" " 34 " 178...	46 44	
	Victoria Phœnix Brewing Co	" 12..	Victoria	" " 34 " 178....	410 01	
	Gowen, C. N.	" 12..	"	" " 34 " 178....	1 68	
	Labatt, John	" 18..	London	" " 34 " 178....	30 44	
	Wilson, D. H.	" 27..	Toronto	" " 34 " 178....	265 48	
	Ambrose, T. H.	May 4..	Peterborough	" " 34 " 178....	6 24	
	McCarthy, D. J.	" 13..	Prescott	" " 29 " 78....	37 32	
	Curren, A. E.	July 6..	Halifax	" " 34 " 238....	105 89	
	Wickwire, W. N.	" 6..	"	" " 34 " 238....	824 66	
	Victoria Phœnix Brewing Co	" 6..	Victoria	" " 34 " 238....	391 48	
	Walkerville Brewing Co., Ltd	" 9..	Windsor	" " 29 " 78....	60 06	
	Wilson, D. H.	" 12..	Toronto	" " 34 " 178....	246 20	
	Roy, J. A.	" 16..	Belleville	" " 29 " 78....	208 82	
	Bixel, A. A.	" 16..	Brantford	" " 29 " 78....	351 19	
	Luke, C.	" 16..	"	" " 29 " 78....	105 12	
	Otterbein, C.	" 16..	"	" " 29 " 78....	111 17	
	Holliday, Thos.	" 16..	Guelph	" " 29 " 78...	531 54	
	Huether, C. N.	" 16..	"	" " 29 " 78...	369 75	
	Rau, Mary	" 16..	"	" " 29 " 78....	209 25	
	Seagram, J. E.	" 16..	"	" " 29 " 78....	170 25	
	Lutz, W. H.	" 16..	"	" " 29 " 78 ...	70 22	
	Bauer, A.	" 16..	"	" " 29 " 78....	281 06	
	"	" 16..	"	" " 29 " 78....	700 02	
	Sleeeman, G.	" 16..	"	" " 29 " 78 ...	1,292 96	
	Clarke, L. H.	" 16..	Stratford	" " 29 " 78....	2,450 45	
	Fisher, John	" 16..	Kingston	" " 29 " 78....	201 22	
	Stevenson, T	" 16..	"	" " 29 " 78....	106 16	
	Carling, T. H	" 16..	London	" " 29 " 78....	1,911 65	

	Dwyer, P. O	"	16..	"	"	"	29	"	78....	216 00		
	Labatt, John	"	16..	"	"	"	29	"	78....	1,245 34		
	Rudolph, Henry	"	16..	"	"	"	29	"	78....	35 77		
	Capital Brewing and Malting Co., The	"	16..	Ottawa	"	"	29	"	78....	290 38		
	Heisz, L	"	16..	Windsor	"	"	29	"	78....	110 26		
	Farquharson & Grainger	"	17..	"	"	"	29	"	78....	117 00		
	Hueter, W	"	17..	Owen Sound	"	"	29	"	78....	179 33		
	Schwan, W	"	17..	"	"	"	29	"	78..	154 80		
	Eaton, Chas	"	17..	"	"	"	29	"	78....	288 84		
	Calcutt, Henry	"	17..	Peterborough	"	"	29	"	78....	255 82		
	Labatt, G. T	"	17..	Prescott	"	"	29	"	78....	132 87		
	Watson, J	"	17..	Stratford	"	"	29	"	78....	168 75		
	Kuntz, Jacob	"	17..	"	"	"	29	"	78 ...	81 07		
	Martini, Jos	"	17..	"	"	"	29	"	78....	51 79		
	Reinhardt, L	"	17..	Toronto	"	"	29	"	78....	1,527 55		
	Brain, E	"	17..		"	"	29	"	78....	157 65		
	Thomas, W. J	"	17..		"	"	29	"	78....	520 29		
	Anderton, C	"	17..		"	"	29	"	78....	121 65		
	Gooderham, W. G	"	17..		"	"	29	"	78....	491 05		
	Simpson, T. W	"	17..		"	"	29	"	78 ..	99 64		
	Orillia Brewing Co., The	"	17..		"	"	29	"	78 ...	54 85		
	Toronto B. & M. Co	"	17..	Toronto	"	"	29	"	78....	1,262 11		
	Ross, W	"	17..	"	"	"	29	"	78....	2,186 48		
	Cosgrove, L. J	"	17..	"	"	"	29	"	78....	995 08		
	O'Keefe, Eugene	"	17..	"	"	"	29	"	78....	1,939 88		
	Boswell Bros	"	17..	Quebec	"	"	29	"	78...	1,223 24		
	Amyot & Gauvin	"	17..	"	"	"	29	"	78....	882 00		
	May, J. P	"	17..	Halifax	"	"	29	"	78....	243 00		
	Curren, A. E	"	17..	"	"	"	29	"	78..	108 00		
	Wickwire, W. N	"	17..	"	"	"	29	"	78....	1,025 25		
	Oland, J. C	"	17..	Charlottetown	"	"	29	"	78....	453 94		
	"	"	17..	"	"	"	29	"	78....	96 80		
	Cross, A. E	"	17..	Calgary	"	"	29	"	78....	359 50		
	Devlin, F	"	17..	Stratford	"	"	29	"	78....	74 36		
												76,952 12
			1900.									
Tobacco	Smith, Jos	July	25..	London	"	"	29	"	78....	7 30		
	Nolan, J. F	"	25..	"	"	"	29	"	78....	4 20		
	Macdonald, Sir W. C	"	25..	Montreal	"	"	29	"	78....	128 20		
	Lemesurier, J	"	25..	Quebec	"	"	34	"	270....	35 00		
	Riley, H. T	Aug.	9..	Charlottetown	"	"	34	"	259....	10 71		
	Nicholson. D	"	9..	"	"	"	29	"	78....	48 00		
	"	"	9..	"	"	"	29	"	78....	35 00		
	G. E. Tuckett, & Son Co., The	"	11..	Hamilton	"	"	34	"	259 ..	22 52		
	American Tobacco Co	"	11..	Montreal	"	"	34	"	238 ...	680 90		
	Gold, T. F	"	11..	Victoria	"	"	34	"	238....	27 25		

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1901.			$ cts.	$ cts.
Tobacco—*Con*	Isaacs, A	Aug. 11.	St. John, N.B	Refunded under Revised Statutes, cap. 34, sec. 238	340 00	
	Henry, T.	" 14.	Montreal	" " 34 " 259	4 76	
	Fortier, J. M	" 14.	"	" " 34 " 259	0 85	
	American Tobacco Co	" 14.	"	" " 34 " 259	626 13	
	Isaacs, A	" 14.	St. John, N.B	" " 34 " 259	11 94	
	Smith, L. M	" 14.	Halifax	" " 34 " 238	90 88	
	McKenna Bros.	" 14.	Pictou	" " 34 " 238	125 12	
	Macdonald, Sir W. C	" 22.	Montreal	" " 34 " 238	17 60	
	Smith, L. M	" 22.	Halifax	" " 34 " 238	86 00	
	Isaacs, A	" 25.	St. John, N.B	" " 34 " 238	244 12	
	McKenna, A	" 25.	Pictou	" " 34 " 238	936 48	
	McKenna Bros.	" 25.	"	" " 34 " 238	41 84	
	G.E. Tuckett & Son Co., The	Sept. 1.	Hamilton	" " 29 " 78	2,327 86	
	Houde, B., & Co.	" 14.	Quebec	" " 34 " 259	156 42	
	G.E. Tuckett & Son Co., The	" 14.	Hamilton	" " 34 " 259	56 22	
	American Tobacco Co	" 14.	Montreal	" " 34 " 270	100 44	
	Isaacs, A	" 14.	St. John, N.B	" " 34 " 238	150 00	
	McKenna Bros	" 14.	Pictou	" " 34 " 238	87 76	
	Isaacs, A	" 18.	St. John, N.B	" " 34 " 259	12 16	
	Fortier, J. M	" 18.	Montreal	" " 34 " 259	4 44	
	American Tobacco Co	" 18.	"	" " 34 " 259	797 42	
	Henry, J	" 18.	"	" " 34 " 259	6 36	
	McKenna, A	Sept. 18.	Pictou	" " 34 " 238	366 32	
	Ein, S	" 18.	Montreal	" " 34 " 259	1 20	
	Fortier, J. M	Oct. 2.	"	" " 34 " 238	205 00	
	Smith, L. M	" 2.	Halifax	" " 34 " 238	13 44	
	McKenna Bros.	" 2.	Pictou	" " 34 " 238	119 68	
	"	" 9.	"	" " 34 " 238	42 16	
	Williams, J. S	" 9.	Toronto	" " 29 " 78	4 58	
	American Tobacco Co	" 10.	Montreal	" " 34 " 270	15 55	
	Isaacs, A	" 10.	St. John, N.B	" " 34 " 259	10 12	
	G.E. Tuckett & Son Co., The	" 10.	Hamilton	" " 34 " 259	52 84	
	Houde, B., & Co.	" 10.	Quebec	" " 34 " 259	94 75	
	G.E. Tuckett & Son Co., The	" 10.	Hamilton	" " 29 " 78	8 70	
	Bernard, W	" 10.	London	" " 29 " 78	1 40	
	Kelly, G	" 12.	"	" " 29 " 78	19 30	

Ein, S	"	15..	Montreal	"	"	34	"	259	0	88
Fortier, J. M	"	16..	"	"	"	34	"	259	4	77
American Tobacco Co	"	16..	"	"	"	34	"	259	718	08
Henry, J	"	16..	"	"	"	34	"	259	3	69
McKenna, A	"	17..	Pictou	"	"	34	"	238	159	92
"	"	19..	"	"	"	34	"	238	57	97
Lemesurier, John	"	19..	Quebec	"	"	34	"	270	11	72
American Tobacco Co	"	25..	Montreal	"	"	34	"	270	79	51
Fortier, J. M.	"	25..	"	"	"	34	"	238	75	50
Isaacs, A	"	25..	St. John, N.B	"	"	34	"	238	189	00
"	"	25..	"	"	"	34	"	238	52	50
McKenna, A	"	27..	Pictou	"	"	34	"	238	302	88
McKenna Bros	"	27..	"	"	"	34	"	238	48	96
Fortier, J. M.	Nov.	7..	Montreal	"	"	34	"	238	553	50
"	"	10..	"	"	"	34	"	238	1,937	00
McKenna, A	"	10..	Pictou	"	"	34	"	238	76	80
McKenna Bros	"	10..	"	"	"	34	"	238	21	60
Isaacs, A	"	10..	St. John, N.B	"	"	34	"	259	20	14
G.E. Tuckett & Son Co., The	"	12..		"	"	34	"	259	56	05
Tobin, J., & Co	"	13..	Halifax	"	"	34	"	238	47	42
Ein, S	"	13..	Montreal	"	"	34	"	259	0	92
Fortier, J. M	"	13..	"	"	"	34	"	259	9	37
American Tobacco Co	"	13..	"	"	"	34	"	259	671	29
Henry, James	"	19..	"	"	"	34	"	259	5	79
"	"	19..	"	"	"	34	"	270	1	75
Houde, B., & Co	"	19..	Quebec	"	"	34	"	259	89	16
Lemesurier, John	"	19..	"	"	"	34	"	259	15	92
American Tobacco Co	"	19..	Montreal	"	"	34	"	238	235	00
Bauld Bros. & Co	"	23..	Halifax	"	"	34	"	259	47	72
Fortier, J. M	"	24..	Montreal	"	"	34	"	259	3,809	75
McKenna, A	"	24..	Pictou	"	"	34	"	259	245	57
American Tobacco Co.	Nov.	30..	Montreal	"	"	34	"	270	432	28
Smith, L. M	Dec.	10..	Halifax	"	"	34	"	238	9	35
G.E. Tuckett & Son Co., The	"	10..	Hamilton	"	"	34	"	259	65	72
Isaacs, A	"	10..	St. John	"	"	34	"	259	13	68
Tobin, J., & Co	"	10..	Halifax	"	"	34	"	238	5	16
Tuckett, G. T.	"	10..	"	"	"	34	"	238	871	68
G.E. Tuckett & Son Co., The	"	10..	"	"	"	34	"	238	602	82
Houde, B., & Co	"	15..	Quebec	"	"	34	"	259	83	44
Ein, S	"	15..	Montreal	"	"	34	"	259	0	99
American Tobacco Co	"	15..	"	"	"	34	"	259	579	81
Fortier, J. M.	"	15..	"	"	"	34	"	259	3	84
Henry, J	"	15..	"	"	"	34	"	259	5	73
Isaacs, A	"	15..	St. John, N.B	"	"	34	"	238	70	00
Fortier, J. M	"	20..	Montreal	"	"	34	"	238	3,840	75
McKenna Bros	"	24	Pictou	"	"	34	"	238	112	24
McKenna, A	"	24..	"	"	"	34	"	238	127	68
"	"	24..	"	"	"	34	"	238	90	16
American Tobacco Co	"	27..	Montreal	"	"	34	"	270	53	43

No. 16.—Refunds of Revenue—*Continued.*

EXCISE—*Continued.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1900.			$ cts.	$ cts.
Tobacco—*Con.*	McKenna Bros.	Dec. 28.	Pictou	Refunded under Revised Statutes, cap 34, sec. 238	43 12	
		1901.				
	Fortier, J. M	Jan. 12.	Montreal	" " 34 " 238	1,829 50	
	G. E. Tuckett & Son Co., The	" 12.	Hamilton	" " 34 " 238	2 00	
	Williams, J. S.	" 12.	Toronto	" " 34 " 238	3 47	
	McKenna, A	" 12.	Pictou	" " 34 " 238	2 45	
	"	" 12.	"	" " 34 " 238	0 12	
	Houde, B., & Co	" 12.	Quebec	" " 34 " 238	48 83	
	Isaacs, A	" 12.	Montreal	" " 34 " 238	9 24	
	G. E. Tuckett & Son Co., The	" 12.	Hamilton	" " 34 " 238	53 42	
	McKenna Bros	" 17.	Pictou	" " 34 " 238	62 64	
	Ein, S	" 17.	Montreal	" " 34 " 238	1 23	
	Fortier, J. M	" 17.	"	" " 34 " 238	9 19	
	American Tobacco Co.	" 17.	"	" " 34 " 238	588 88	
	Henry, Jas.	" 17.	"	" " 34 " 238	4 57	
	Macdonald, Sir W. C	" 26.	"	" " 34 " 238	199 20	
	Isaacs, A	" 31.	St. John, N.B.	" " 34 " 238	85 00	
	McKenna Bros	" 31.	Pictou	" " 34 " 238	24 96	
	Tuckett, G. T.	Feb. 14.	Hamilton	" " 34 " 238	4 58	
	G. E. Tuckett & Son Co., The	" 14.	"	" " 34 " 238	520 92	
	Tremain, S.	" 14.	Halifax	" " 34 " 238	6 61	
	McKenna Bros	" 14.	Pictou	" " 34 " 238	9 44	
	Henry, Jas.	" 14.	Montreal	" " 34 " 238	0 57	
	Ein, S	" 14.	"	" " 34 " 238	1 09	
	Fortier, J. M. Fortier	" 14.	"	" " 34 " 238	4 10	
	American Tobacco Co.	" 14.	"	" " 34 " 238	543 89	
	Lemesurier, John.	April 19.	Quebec	" " 34 " 259	17 10	
	Houde, B., & Co	" 19.	"	" " 34 " 238	37 50	
	Isaacs, A	" 20.	St. John, N.B.	" " 34 " 238	70 00	
	Fortier, J. M.	" 27.	Montreal	" " 34 " 238	2,382 12	
	American Tobacco Co.	" 30.	"	" " 34 " 270	131 13	
	McKenna, A	May 1.	Pictou	" " 34 " 270	3 60	

Hobrecker, A.	"	3	Halifax	"	"	34	"	238	34	02
"	"	3	"	"	"	34	"	238	40	09
McKenna, A.	"	7	Pictou	"	"	34	"	238	232	16
Hobrecker, A.	"	10	Halifax	"	"	34	"	238	31	12
Tobin, J., & Co	"	10	"	"	"	34	"	238	12	49
G. E. Tuckett & Son Co., The	"	10	Hamilton	"	"	34	"	238	73	48
Isaacs, A	"	11	St. John, N.B	"	"	34	"	259	14	83
Fortier, J. M	"	13	Montreal	"	"	34	"	259	3	87
Henry, Jas	"	13	"	"	"	34	"	259	3	67
American Tobacco Co	"	13	"	"	"	34	"	259	787	83
Ein, S	"	13	"	"	"	34	"	259	1	45
Houde, B., & Co	"	13	Quebec	"	"	34	"	259	70	74
McKenna, A	"	13	Pictou	"	"	34	"	238	420	57
Henry, James	"	17	Montreal	"	"	34	"	238	441	84
McKenna Bros	"	17	Pictou	"	"	34	"	270	8	00
Lemesurier, John	"	17	Quebec	"	"	34	"	259	3	73
Dyer, J. J	"	27	London	"	"	34	"	238	4	30
McDonald, R. D	"	27	"	"	"	34	"	238	22	10
Henry, James	"	29	Montreal	"	"	34	"	270	1	17
G. E. Tuckett & Son Co., The	"	31	Hamilton	"	"	34	"	238	1,064	94
McKenna, A	June	7	Pictou	"	"	34	"	238	56	40
G. E. Tuckett & Son Co., The	"	13	Hamilton	"	"	34	"	259	67	06
Isaacs, A	"	13	St. John	"	"	34	"	259	13	12
Nelson, C. H	"	13	Montreal	"	"	34	"	238	1	30
McDonald, R. D	"	17	London	"	"	34	"	238	7	80
Fortier, J. M	"	18	Montreal	"	"	34	"	238	2,162	87
"	"	18	"	"	"	34	"	259	4	92
American Tobacco Co	"	18	"	"	"	34	"	238	501	60
" "	"	18	"	"	"	34	"	259	761	81
Henry, James	"	18	"	"	"	34	"	259	6	77
Ein, S	"	18	"	"	"	34	"	259	1	55
Houde, B., & Co	"	18	Quebec	"	"	34	"	259	79	86
Lemesurier, John	"	19	"	"	"	34	"	270	13	26
McKenna, A	"	20	Pictou	"	"	34	"	238	74	80
G. E. Tuckett & Son Co., The	"	26	Hamilton	"	"	34	"	238	366	32
American Tobacco Co	July	6	Montreal	"	"	34	"	238	336	96
G. E. Tuckett & Son Co., The	"	6	Hamilton	"	"	34	"	259	93	85
" "	"	6	"	"	"	29	"	78	5	26
Tobin, J., & Co	"	8	Halifax	"	"	34	"	238	5	68
Williams, J. S	"	11	Toronto	"	"	29	"	78	9	11
Nicholson, D	"	11	Charlottetown	"	"	34	"	259	0	75
Isaacs, A	"	11	St. John, N.B	"	"	34	"	259	17	73
Macdonald, Sir W. C	"	11	Montreal	"	"	34	"	238	141	80
Houde, B. & Co	"	11	Quebec	"		34	"	259	72	00

No. 16.—Refunds of Revenue—*Concluded.*

EXCISE—*Concluded.*

Articles.	To whom paid.	Date.	Divisions.	Under what Authority Refunded.	Amounts.	Totals.
		1901.			$ cts.	$ cts.
Tobacco—*Con.*	Isaacs, A.	Feb. 14.	St. John, N.B.	Refunded under Revised Statutes, cap. 34, sec. 259	8 90	
	Houde, B., & Co.	" 16.	Quebec	" " 34 " 259	34 68	
	Bauld Bros. & Co.	" 18.	Halifax	" " 34 " 238	3 59	
	Smith, L. M.	" 18.	"	" " 34 " 238	10 08	
	G.E. Tuckett & Son Co., The	" 18.	Hamilton	" " 34 " 259	36 04	
	Macdonald, Sir W. C.	" 25.	Montreal	" " 34 " 238	18 50	
	American Tobacco Co.	" 26.	"	" " 34 " 270	6 56	
	" "	" 27.	"	" " 34 " 238	365 80	
	Fortier, J. M.	" 27.	"	" " 34 " 238	3,421 75	
	American Tobacco Co.	March 1.	"	" " 34 " 270	8 77	
	Houde, B., & Co.	" 6.	Quebec,	" " 34 " 270	99 41	
	G.E. Tuckett & Son Co., The	" 11.	Hamilton	" " 34 " 259	61 08	
	Isaacs, A.	" 11.	St. John, N.B.	" " 34 " 259	9 60	
	Tobin, J., & Co.	" 11.	Halifax	" " 34 " 238	7 18	
	Nicholson, D.	" 11.	Charlottetown	" " 34 " 270	60 00	
	Houde, B., & Co.	" 11.	Quebec	" " 34 " 259	42 99	
	Fortier, J. M.	" 13.	Montreal	" " 34 " 238	51 12	
	Henry, J.	" 15.	"	" " 34 " 259	3 34	
	Ein, S.	" 15.	"	" " 34 " 259	1 20	
	American Tobacco Co.	" 15.	"	" " 34 " 259	528 22	
	Fortier, J. M.	" 15.	"	" " 34 " 259	0 69	
	Tobin, J., & Co.	" 18.	Halifax	" " 34 " 238	50 86	
	Fortier, J. M.	" 20.	Montreal	" " 34 " 238	2,445 12	
	American Tobacco Co.	" 20.	"	" " 34 " 270	13 89	
	Smith, L. M.	" 20.	Halifax	" " 34 " 238	11 22	
	McKenna, A.	" 23.	Pictou	" " 34 " 238	344 64	
	Macdonald, Sir W. C.	" 25.	Montreal	" " 34 " 238	128 70	
	McKenna, A.	" 26.	Pictou	" " 34 " 238	99 04	
	American Tobacco Co.	" 26.	Montreal	" " 34 " 238	7 85	
	G.E. Tuckett & Son Co., The	" 28.	Hamilton	" " 34 " 238	328 50	
	American Tobacco Co.	" 28.	Montreal	" " 34 " 238	16 23	
	McKenna, A.	" 30.	Pictou	" " 44 " 238	1,269 68	
	"	April 4.	"	" " 34 " 238	316 16	
	"	" 4.	"	" " 34 " 238	155 48	
	American Tobacco Co.	" 9.	Montreal	" " 34 " 270	10 04	
	" "	" 9.	"	" " 34 " 270	1 63	

	G.E. Tuckett & Son Co., The	"	9	Hamilton	"	"	34	"	259	81 04	
	" "	"	9	"	"	"	29	"	78	3 22	
	Williams, J. S.	"	9	Toronto	"	"	29	"	78	0 50	
	Fortier, J. M.	"	17	Montreal	"	"	34	"	259	2 94	
	Henry, Jas.	"	17	"	"	"	34	"	259	8 45	
	American Tobacco Co.	"	17	"	"	"	34	"	259	639 32	
	Ein, S.	"	17	"	"	"	34	"	259	1 39	
	Houde, B., & Co.	"	17	"	"	"	34	"	259	41 61	
	Isaacs, A.	"	17	St. John, N.B.	"	"	34	"	259	5 10	
	McKenna, A.	"	17	Pictou	"	"	34	"	238	104 40	
	McKenna Bros.	July	12	"	"	"	34	"	238	18 00	
	Isaacs Bros.	"	12	St. John, N.B.	"	"	34	"	238	166 25	
										50,524 05	
		1900.				Less refunded				8 90	50,515 15
Cigars	Skelly, Sophia M.	Feb.	7	Guelph	Refunded under Revised Statutes, cap. 34, sec. 238					37 50	37 50
		1901.									
Manufactures in bond	Howard, A. L., Estate of	May	27	Sherbrooke	"	"	34	"	238	150 00	150 00
		1900.									
Other receipts	Allen, Solomon.	Aug.	4	Brantford	"	"	34	"	238	300 00	300 00
Seizures	Moreau, E. P	July	24	Montreal	"	"	34	"	238	45 60	
	Latchford, F. R.	"	30	Ottawa	"	"	34	"	238	10 00	55 00
		1901.									
Methylated spirits	The McCormick Man. Co., Ltd	May	23	London	"	"	34	"	238		73 94
					Grand Total						180,781 16

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

DR. No. 17.—DEPARTMENTAL EXPENDITURES. CR.

Due by sundry persons, July 1, 1900.	Disbursed by the Receiver General.	Deductions for Superannuation.	Retirement.	Totals.	——	Salaries.	Contingencies.	Due by sundry persons, June 30, 1901.	Totals.
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
	7,000 00			7,000 00	Minister of Inland Revenue	7,000 00			7,000 00
	36,475 77	799 74	9 92	37,285 43	Departmental Officers	37,285 43			37,285 43
	208 09			208 09	Subscription to Newspapers		208 09		208 09
	1,723 98			1,723 98	Extra Clerks		1,723 98		1,723 98
	358 53			358 53	Telegraph Companies and Telephone		358 53		358 53
	1,760 26			1,760 26	Stationery		1,760 26		1,760 26
	216 15			216 15	Books and Maps		216 15		216 15
	1,178 24			1,178 24	Printing and Lithographing		1,178 24		1,178 24
	32 83			32 83	Postage		32 83		32 83
16 66	381 62			398 28	Sundry persons		381 62	16 66	398 28
16 66	49,335 47	799 74	9 92	50,161 79	Totals	44,285 43	5,859 70	16 66	50,161 79

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

WEIGHTS AND MEASURES, GAS, ELECTRIC LIGHT AND LAW STAMPS.

DR. No. 18.—STATEMENT showing amount of Revenue accrued during Year ended June 30, 1901. CR.

—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps.		Totals.	—	Weights and Measures Stamps.	Gas Stamps.	Electric Light Stamps.	Law Stamps.		Totals.
				Supreme Court.	Exchequer Court.						Supreme Court.	Exchequer Court.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
To amount of stamps destroyed or returned by distributors	109 30	4 00	1 50			114 80	By amount of stamps in the hands of distributors on July 1, 1900	37,934 68	28,710 55	33,972 50			100,617 73
To commission allowed				77 50	192 30	269 80	By stamps issued by Inland Revenue Department during the year	56,341 00	24,450 00	13,325 00	1,550 00	3,846 00	99,512 00
To amount of stamps remaining in hands of distributors, June 30, 1900	39,853 03	30,766 05	36,534 50			107,153 58							
To balance, being the revenue during 1900-1901	54,313 35	22,390 50	10,761 50	1,472 50	3,653 70	92,591 55							
Totals	94,275 68	53,160 55	47,297 50	1,550 00	3,846 00	200,129 73	Totals	94,275 68	53,160 55	47,297 50	1,550 00	3,846 00	200,129 73

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

DR. No. 19 (A).—INSPECTION DIVISIONS in Account with Revenue. CR.

BALANCES DUE BY INSPECTORS, JULY 1, 1900.		Stamps issued to Inspect'rs.	Seizures and Penalties.	Other Receipts.	Totals.	DIVISIONS.	Stamps returned or destroyed.	Deposited to the credit of the Receiver General.	BALANCES DUE BY INSPECTORS, JUNE 30, 1901.		Totals.
Stamps on hand.	Cash on hand.								Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
4,517 90	24 30	2,425 00	.....	.....	6,967 20	....Belleville.....	39 10	3,755 65	2,942 65	230 40	6,967 20
4,250 45	.....	7,988 00	.....	.....	12,238 45	....Hamilton.....	.....	8,992 26	3,246 19	.....	12,238 45
2,585 35	.....	5,300 00	.....	100 00	7,985 35	....Ottawa.....	49 45	5,415 20	2,520 70	.....	7,985 35
4,446 44	330 20	6,491 00	15 00	.....	11,282 64	....Toronto.....	.....	6,396 08	4,573 42	313 14	11,282 64
2,731 05	.....	6,150 00	20 00	.....	8,881 05	...Windsor.....	.....	5,698 10	3,182 95	.....	8,881 05
18,531 19	354 50	28,334 00	35 00	100 00	47,354 69	.....*Ontario*	88 55	30,257 29	16,465 31	543 54	47,354 69
8,016 30	1,451 07	12,430 00	.....	.....	21,897 37	....Montreal.....	.....	12,139 35	9,112 07	645 95	21,897 37
2,875 47	170 43	3,221 00	.....	.....	6,326 90	....Quebec.....	.....	2,885 85	2,617 71	823 34	6,326 90
2,719 90	.....	740 00	.....	.....	3,459 90	....Three Rivers.....	.....	1,093 90	2,366 00	.....	3,459 90
13,611 67	1,621 50	16,451 00	.....	.....	31,684 17	..... .*Quebec*.....	.....	16,119 10	14,095 78	1,469 29	31,684 17
643 02	25 47	2,516 00	.....	.....	3,184 49	.....*St. John, N.B*	.....	1,413 49	1,771 00	.....	3,184 49
540 77	2 00	162 50	.....	.....	705 27	....Cape Breton.	20 75	384 79	299 73	.....	705 27
250 63	58 84	1,270 00	.....	.....	1,579 47	....Halifax	.....	696 40	802 57	80 50	1,579 47
790 35	.....	700 00	.....	.....	1,490 35	....Pictou	.....	574 35	884 23	31 77	1,490 35
1,581 75	60 84	2,132 50	.....	.....	3,775 09	....*Nova Scotia*.....	20 75	1,655 54	1,986 53	112 27	3,775 09
331 21	.....	747 50	.....	.....	1,078 71	.....*Charlottetown, P.E.I*.....	.....	327 50	751 21	.....	1,078 71

2,705 09	.....	4,775 00	.....	.....	7,480 09	..... *Winnipeg, Man.*	.....	3,753 03	3,727 06	.....	7,480 09
111 90	.....	845 00	.....	.....	956 90	..... *Calgary, N.W.T.*	.....	464 41	492 49	.....	956 90
418 85	.....	540 00	.....	.....	958 85	..... *Victoria, B.C.*	.....	395 20	563 65	.....	958 85
37,934 68	2,062 31	56,341 00	35 00	100 00	96,472 99	..... Grand Totals	109 30	54,385 56	39,853 03	2,125 10	96,472 99

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

WEIGHTS AND MEASURES, 1900–1901.

No. 19 (B).—Deputy Inspectors of the Old Divisions in Account with Revenue.

DR. CR.

Balances due July 1, 1900. — Cash on hand.	Totals.	Divisions.	Balances due June 30, 1901. — Cash on hand.	Totals.
$ cts.	$ cts.		$ cts.	$ cts.
87 10	87 10	Essex	87 10	87 10
87 10	87 10	*Ontario*	87 10	87 10
5 62	5 62	Hull	5 62	5 62
5 62	5 62	*Quebec*	5 62	5 62
92 72	92 72	Totals	92 62	92 72

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

WEIGHTS AND MEASURES, 1900–1901.

No. 20 (A).—Inspection Divisions in Account with Expenditures.

(*For Details, see Appendix B.*)

Dr. Cr.

Balances due by Inspectors, July 1, 1900.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for				Totals.	Divisions.	Balances due to Inspectors, July 1, 1900.	Expenditures Authorized by the Department.						Totals.
		Superannuation.	Insurance.	Retirement.	Guarantee				Salaries.	Seizures.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	5,883 44	51 92	.....	....	10 80	5,946 16	Belleville	.....	3,399 92	...	499 92	290 00	1,304 69	451 63	5,946 16
.....	7,063 66	32 08	...	.....	14 40	7,110 14	Hamilton	... ..	5,899 84	... ..	... .	.....	1,101 90	108 40	7,110 14
.....	5,499 45	7 04	41 76	....	10 80	5,559 05	Ottawa	125 00	3,862 65	.....	.....	250 00	1,123 20	198 20	5,559 05
.....	5,862 32	16 03	.....	. ....	10 80	5,889 15	Toronto	.....	4,099 88	.....	... .	.....	1,652 10	137 17	5,889 15
.....	4,921 44	24 00	.....	.....	9 00	4,954 44	Windsor	....	3,449 76	1 85	.....	.....	1,300 87	201 96	4,954 44
.....	29,230 31	131 07	41 76	....	55 80	29,458 94	*Ontario*	125 00	20,712 05	1 85	499 92	540 00	6,482 76	1,097 36	29,458 94
.....	10,395 53	64 04	.....	.....	19 80	10,479 37	Montreal	270 70	8,199 68	... ..	.....	.....	1,683 30	325 69	10,479 37
160 00	7,041 85	64 33	38 28	.....	13 50	7,317 96	Quebec	.....	5,222 13	... .	62 49	200 00	1,533 67	299 67	7,317 96
.....	2,108 79	.....	.....	34 96	5 40	2,149 15	Three Rivers	. ...	1,699 96	.....	.....	.....	439 60	9 59	2,149 15
160 00	19,546 17	128 37	38 28	34 96	38 70	19,946 48	*Quebec*	270 70	15,121 77	.....	62 49	200 00	3,656 57	634 95	19,946 48
.....	3,448 04	49 96	.....	.. .	7 95	3,505 95	*St. John, N.B.*	.....	2,770 96	....	299 30	.....	417 55	18 14	3,505 95
.....	1,143 15	.. ...	.....	.....	3 60	1,146 75	Cape Breton	.....	800 00	.. . .	.... .	37 50	281 40	27 85	1,146 75
.....	2,327 00	.....	.. ...	.....	5 40	2,332 40	Halifax	.....	1,599 96	.....	.....	375 00	202 20	155 24	2,332 40
.....	1,785 79	19 96	.. .	...	5 40	1,811 15	Pictou	. ....	1,600 00	.....	.....	12 50	149 17	49 48	1,811 15
.....	5,255 94	19 96	.....	.. .	14 40	5,290 30	*Nova Scotia*	.....	3,999 96	.. ...	. .....	425 00	632 77	232 57	5,290 30

No. 20 (A).—Inspection Divisions in Account with Expenditures— *Concluded.*

Dr. (*For Details, see Appendix B.*) Cr.

Balances due by Inspectors, July 1, 1900.	Amounts received from Department to meet Expenditures.	Deductions from Salaries for				Totals.	Divisions.	Balances due to Inspectors, July 1, 1900.	Expenditures Authorized by the Department.						Totals.
		Superannuation.	Insurance.	Retirement.	Guarantee				Salaries.	Seizures.	Special Assistance	Rent.	Travelling Expenses.	Sundries.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
.....	1,662 21	.....	....	.....	8 70	1,670 91	.. *Charlottetown, P.E.I.*....	.... .	1,500 00	. . ..	.....	... .	109 44	61 47	1,670 91
.....	5,462 91	4 04	.....	... ..	10 80	5,477 75	..Winnipeg, Man.....	....	2,899 88	.....	1,058 41	108 00	1,311 60	99 86	5,477 75
.....	1,047 30	13 96	.. .	.....	5 40	1,066 66	..Calgary.....	.....	899 92	... ..	.....	... .	166 74	.....	1,066 66
.....	6,510 21	18 00	.....	.....	16 20	6,544 41	.....*Manitoba.*	.....	3,799 80	.....	1,058 41	108 00	1,478 34	99 86	6,544 41
.....	2,066 64	.	.....	.....	5 40	2,072 04	.....*Victoria, B.C.*.....	.....	1,149 84	.....	.....	.....	840 70	81 50	2,072 04
.....	718 63	14 63	.....	... ..	.....	733 26	..Commissioner of Standards.....	....	733 26	.....	... .	....	.....	.....	733 26
.....	1,510 16	.....	.. .	. ....	.....	1,510 16	..General Contingencies....	.....	.....	.. ..	. .....	.....	....	1,510 16	1,510 16
.....	575 23	.....	.....	.....	.....	575 23	..Printing.....	.....	.....	.....	.....	.. ....	....	575 23	575 23
.....	132 69	....	.....	.....	.. ...	132 69	..Stationery.....	.....	....	....	....	.....	.....	132 69	132 69
160 00	70,656 23	361 99	80 04	34 96	147 15	71,440 37	.....Grand Totals.....	395 70	49,787 64	1 85	1,920 12	1,273 00	13,618 13	4,443 93	71,440 37

Inland Revenue Department,
Ottawa, August 10, 1901.

W. J. GERALD,
Deputy Minister.

WEIGHTS AND MEASURES, 1900-1901.

Dr. No. 20 (B).—Inspection Divisions in Account with Expenditures. Cr.

Balances due by sundry persons, July 1, 1900.	Totals.	Divisions.	Balances due by sundry persons, June 30, 1901.	Totals.
$ cts.	$ cts.		$ cts.	$ cts
39 56	39 56	Essex	39 56	39 56
33 53	33 53	Waterloo	33 53	33 53
73 09	73 09	*Ontario*	73 09	73 09
0 33	0 33	Drummond	0 33	0 33
41 45	41 45	Laval	41 45	41 45
26 88	26 88	Montmorency	26 88	26 88
27 51	27 51	Richelieu	27 51	27 51
96 17	96 17	*Quebec*	96 17	96 17
24 00	24 00	Lunenburg, Nova Scotia	24 00	24 00

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

GAS INSPECTION AND LAW STAMPS, 1900-1901.

DR. No. 21.—INSPECTION DISTRICTS and Stamp Distributors in Account with Revenue. CR.

BALANCES DUE BY INSPECTORS, JULY 1, 1900.		Stamps issued to Inspectors and others.	Penalties.	Other Receipts.	Totals.	DIVISIONS.	Commission allowed to Distributors of stamps.	Returned damaged stamps.	Deposited to the credit of the Receiver General.	BALANCES DUE BY INSPECTORS, JUNE 30, 1901.		Totals.
Stamps on hand.	Cash on hand.									Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
735 25					735 25	Barrie			58 00	677 25		735 25
652 75					652 75	Belleville			132 00	486 25	34 50	652 75
405 00		50 00			455 00	Berlin			196 50	258 50		455 00
423 75		212 50			636 25	Brockville			292 00	344 25		636 25
178 75		125 00			303 75	Cobourg			130 75	173 00		303 75
344 00					344 00	Cornwall			40 25	303 75		344 00
442 75		350 00			792 75	Guelph		4 00	263 00	525 75		792 75
2,289 25		1,425 00			3,714 25	Hamilton			1,647 25	1,885 25	181 75	3,714 25
1,145 00					1,145 00	Kingston			323 00	783 50	38 50	1,145 00
127 00	11 00	237 50			375 50	Listowel			80 00	295 50		375 50
651 50		3,800 00	10 00		4,461 50	London			2,596 00	1,865 50		4,461 50
190 00					190 00	Napanee			45 75	119 25	25 00	190 00
2,573 25		950 00			3,523 25	Ottawa			607 75	2,915 50		3,523 25
302 25					302 25	Owen Sound			61 25	241 00		302 25
1,081 25					1,081 25	Peterborough			77 00	987 25	17 00	1,081 25
775 00		175 00			950 00	Sarnia			206 25	743 75		950 00
863 75					863 75	Stratford			73 25	790 50		863 75
4,617 55	589 75	8,750 00			13,957 30	Toronto			7,360 25	6,043 80	553 25	13,957 30
17,798 05	600 75	16,075 00	10 00		34,483 80	*Ontario*		4 00	14,190 25	19,439 55	850 00	34,483 80
1,429 00		6,050 00		12 30	7,491 30	Montreal			5,523 05	1,968 25		7,491 30
1,158 50	57 50				1,216 00	Quebec			358 00	798 25	59 75	1,216 00
480 50					480 50	Sherbrooke			36 00	444 50		480 50
3,068 00	57 50	6,050 00		12 30	9,187 80	*Quebec*			5,917 05	3,211 00	59 75	9,187 80
907 50					907 50	Fredericton			60 25	847 25		907 50
1,167 50		175 00			1,342 50	St. John			361 75	980 75		1,342 50
2,075 00		175 00			2,250 00	*New Brunswick*			422 00	1,828 00		2,250 00

689 50	91 25	775 00	.....	.....	1,555 75	*Halifax, N.S.*	.....	.....	518 75	959 00	78 00	1,555 75
816 00	.....	.....	.....	.....	816 00	*Charlottetown, P.E.I.*	.....	.....	88 00	728 00	.....	816 00
598 50	.....	1,100 00	.....	.....	1,698 50	*Winnipeg, Man.*	.....	.....	476 00	1,222 50	.....	1,698 50
850 25	.....	175 00	.....	.....	1,025 25	Nanaimo	.....	.....	108 25	917 00	.....	1,025 25
1,732 25	15 00	.....	.....	.....	1,747 25	Vancouver	.....	.....	267 50	1,463 75	16 00	1,747 25
1,083 00	.....	100 00	.....	.....	1,183 00	Victoria	.....	.....	185 75	997 25	.....	1,183 00
3,665 50	15 00	275 00	.....	.....	3,955 50	*British Columbia*	.....	.....	561 50	3,378 00	16 00	3,955 50
28,710 55	764 50	24,450 00	10 00	12 30	53,947 35	Grand Totals	.....	4 00	22,173 55	30,766 05	1,003 75	53,947 35
.....	.....	5,396 00	.....	.....	5,396 00	Law Stamps	269 80	.....	5,126 20	.....	.....	5,396 00

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

GAS

No. 22.—Inspection Districts in

Dr. (*For Details, see*

Balances due by Inspectors, July 1, 1900.	Amounts received from Department to meet Expenditure.	Deductions from Salaries for			Totals.	Divisions.
		Superannuation.	Retirement.	Guarantee.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	
	94 93	2 00		3 60	100 53	Barrie
	602 46	4 96		5 40	612 82	Belleville
	238 73			3 30	242 03	Berlin
	136 87				136 87	Brockville
	170 20	2 00		3 60	175 80	Cobourg
	136 70	2 00		3 60	142 30	Cornwall
	208 41	4 00		3 60	216 01	Guelph
	2,688 50	36 00		7 20	2,731 70	Hamilton
	481 93			3 60	485 53	Kingston
	194 62			3 60	198 22	Listowel
	1,666 10			3 60	1,669 70	London
	1,966 88			3 60	1,970 48	Ottawa
	318 90	4 00		3 60	326 50	Owen Sound
	156 48			3 60	160 08	Peterborough
	26 60				26 60	Sarnia
	216 40	4 00		3 60	224 00	Stratford
	2,607 85	31 96		5 40	2,645 21	Toronto
	11,912 56	90 92		60 90	12,064 38	*Ontario*
	3,071 84			5 40	3,077 24	Montreal
	1,433 19	25 96		3 60	1,462 75	Quebec
	94 40	2 00		3 60	100 00	Sherbrooke
	35 22			0 86	36 08	St. Hyacinthe
	4,634 65	27 96		13 46	4,676 07	*Quebec*
	196 40			3 60	200 00	Fredericton
	1,072 30			3 60	1,075 90	St. John
	1,268 70			7 20	1,275 90	*New Brunswick*
31 68	2,668 27	25 96		7 20	2,733 11	Halifax
12 88					12 88	Pictou
44 56	2,668 27	25 96		7 20	2,745 99	*Nova Scotia*
	52 12				52 12	*Charlottetown, P.E.I.*
	355 17			3 60	358 77	*Winnipeg, Man*
	96 40			3 60	100 00	Nanaimo
	91 40		5 00	3 60	100 00	New Westminster
	413 03	6 00		3 60	422 63	Vancouver
	199 95	4 00		3 60	207 55	Victoria
	800 78	10 00	5 00	14 40	830 18	*British Columbia*

SESSIONAL PAPER No. 12

INSPECTION.

Account with Expenditures, 1900–1901.

Appendix B.) CR.

Balances due to Inspectors, July 1, 1900.	Expenditure authorized by the Department.					Balances due by Inspectors, June 30, 1901.	Totals.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	100 00				0 53		100 53
	349 96		164 75	35 95	62 16		612 82
13 46	183 29			31 50	13 78		242 03
21 41		99 96			15 50		136 87
	100 00			39 00	36 80		175 80
	100 00				42 30		142 30
3 10	200 00				12 91		216 01
13 60	2,496 73		36 00	114 85	70 52		2,731 70
9 15	400 00		22 50		53 88		485 53
18 00	100 00		60 00		20 22		198 22
44 80	1,000 00	76 00	95 00	429 80	24 10		1,669 70
57 08	1,000 00	540 00	300 00		73 40		1,970 48
	200 00		125 00		1 50		326 50
	152 08			2 00	6 00		160 08
5 60			20 00	0 25	0 75		26 60
8 00	200 00			9 00	7 00		224 00
	2,599 96				45 25		2,645 21
194 20	9,182 02	715 96	823 25	662 35	486 60		12,064 38
56 35	2,199 84	370 00	240 00	92 25	118 80		3,077 24
8 85	1,300 00		150 00		3 90		1,462 75
	100 00						100 00
	36 08						36 08
65 20	3,635 92	370 00	390 00	92 25	122 70		4,676 07
	200 00						200 00
	1,000 00			68 52	7 38		1,075 90
	1,200 00			68 52	7 38		1,275 90
	1,799 92		389 70	432 14	111 35		2,733 11
						12 88	12 88
	1,799 92		389 70	432 14	111 35	12 88	2,745 99
11 71	11 66				28 75		52 12
33 25	200 00		81 00	7 50	37 02		358 77
	100 00						100 00
	100 00						100 00
10 50	300 00			28 90	83 23		422 63
	200 00				7 55		207 55
10 50	700 00			28 90	90 78		830 18

GAS

No. 22.—INSPECTION DISTRICTS in

DR. (*For Details, see*

Balances due by Inspectors, July 1, 1900.	Amounts received from Department to meet Expenditure.	Deductions from Salaries for			Totals.	Divisions.
		Superannuation.	Retirement.	Guarantee.		
$ cts	$ cts.	$ cts.	$ cts.	$ cts.		
200 00	680 37	.....	.....	.....	880 37	..General ....
.....	384 06	.....	.....	.....	384 06	.General expenses..... ...
.....	208 49	.....	.....	.....	208 49	..Printing.....
.....	106 72	.....	.....	.....	106 72	..Stationery... .....
244 56	23,071 89	154 84	5 00	106 76	23,583 05	.... Grand Totals... ....

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

INSPECTION.

Account with Expenditures, 1900–1901—*Concluded.*

Appendix B.) Cr.

Balances due to Inspectors, July 1, 1900.	Expenditure authorized by the Department.					Balances due by Inspectors, June 30, 1901.	Totals.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
....	... ..	.. ..	.....	33 75	646 62	200 00	880 37
....	.....	.....	.....	....	384 06	.....	384 06
....	... ...	... .	.....	.....	208 49	.....	208 49
. ...	....	.....	....	.. . ...	106 72	.....	106 72
314 86	16,729 52	1,085 96	1,683 95	1,325 41	2,230 47	212 88	23,583 05

W. J. GERALD,
Deputy Minister.

ELECTRIC LIGHT STAMPS, 1900–1901.

DR. **No. 23.—Inspection Districts in Account with Revenue.** CR.

Balances, July 1, 1900.		Stamps issued to Inspectors	Registration Fees Accrued.	Other Receipts	Totals.	Districts.	Returned damaged Stamps.	Deposited to the credit of the Receiver General.		Balances, June 30, 1901.		Total.
Stamps on hand.	Cash on hand.							Registration Fees.*	Inspection Fees.	Stamps on hand.	Cash on hand.	
$ cts.	$ cts.	$ cts.	$ cts	$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1,051 00	....	1,075 00	545 00	....	2,671 00	..Belleville.....	1 50	545 00	243 25	1,881 25	.....	2,671 00
1,960 75	....	800 00	365 00	.....	3,125 75	..Hamilton	....	365 00	821 75	1,904 75	34 25	3,125 75
1,914 25	.....	825 00	680 00	.....	3,419 25	..London..	....	680 00	581 75	2,157 50	. ...	3,419 25
6,062 75	.. ....	1,300 00	380 00	.....	7,742 75	..Ottawa.....	.....	380 00	735 50	6,627 25	....	7,742 75
6,356 75	59 50	3,750 00	935 00	.....	11,101 25	..Toronto.....	.....	935 00	1,573 00	8,503 25	90 00	11,101 25
17,345 50	59 50	7,750 00	2,905 00	.....	28,060 00	....*Ontario*	1 50	2,905 60	3,955 25	21,074 00	124 25	28,060 00
4,834 25	... .	2,450 00	310 00	.. ...	7,594 25	..Montreal..	....	310 00	2,728 75	4,555 50	.....	7,594 25
2,338 50	52 50	1,125 00	132 50	.....	3,648 50	..Quebec.....	....	132 50	1,213 50	2,153 75	148 75	3,648 50
503 25	.. ....	.....	340 00	.....	843 25	..Sherbrooke	.....	340 00	237 00	266 25	.....	843 25
7,676 00	52 50	3,575 00	782 50	.....	12,086 00	....*Quebec*	.....	782 50	4,179 25	6,975 50	148 75	12,086 00
1,857 25	. . ....	350 00	185 00	.....	2,392 25	....*St. John, N.B.*..	.....	185 00	562 75	1,644 50	.....	2,392 25
2,139 25	4 25	450 00	375 00	.....	2,968 50	....*Halifax, N.S.*..	. .. .	375 00	372 75	2,151 75	69 00	2,968 50
991 50	....	975 00	275 00	8 77	2,250 27	....*Winnipeg, Man.*.....	....	275 00	428 77	1,546 50	.....	2,250 27
2,804 00	58 50	....	215 00	....	3,077 50	..Vancouver.....	.....	215 00	769 00	2,056 00	37 50	3,077 50
1,159 00	....	225 00	60 00	.....	1,444 00	..Victoria..... ..	....	60 00	297 75	1,086 25	.....	1,444 00
3,963 00	58 50	225 00	275 00	....	4,521 50	. ..*British Columbia*.....	....	275 00	1,066 75	3,142 25	37 50	4,521 50
33,972 50	174 75	13,325 00	4,797 50	8 77	52,278 52	....Grand Totals...	1 50	4,797 50	10,565 52	36,534 50	379 50	52,278 52

*These fees were collected by the Collectors of Inland Revenue.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

ELECTRIC LIGHT INSPECTION.

No. 24.—Inspection Districts in Account with Expenditures, 1900–1901.

Dr. (*For Details, see Appendix B.*) Cr.

Amounts received from Department to meet Expenditures.	Totals.	—	Expenditures Authorized by the Department.					Balances due to Inspectors July 1, 1900.	Totals.
			Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.		
$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
187 08	187 08	Belleville				169 91	17 17		187 08
102 40	102 40	Hamilton				86 50	1 15	14 75	102 40
112 10	112 10	London				97 00	4 00	11 10	112 10
192 95	192 95	Toronto				140 80	8 45	43 70	192 95
464 80	464 80	Montreal		360 00		19 50	9 75	75 55	464 80
73 82	73 82	Quebec					63 64	10 18	73 82
116 64	116 64	Sherbrooke				74 45	2 14	40 05	116 64
122 46	122 46	St. John				102 54	17 80	2 12	122 46
207 99	207 99	Halifax				142 84	3 75	61 40	207 99
223 70	223 70	Winnipeg			27 00	162 00	8 75	25 95	223 70
63 00	63 00	Vancouver						63 00	63 00
18 75	18 75	Victoria				14 50	3 45	0 80	18 75
2,999 47	2,999 47	Chief electrical engineer	2,400 00	30 00		463 17	106 30		2,999 47
4,199 26	4,199 26	General					4,199 26		4,199 26
7 35	7 35	Printing					7 35		7 35
16 20	16 20	Stationery					16 20		16 20
9,107 97	9,107 97	Totals	2,400 00	390 00	27 00	1,473 21	4,469 16	348 60	9,107 97

Inland Revenue Department,
Ottawa, August 10, 1901.

W. J. GERALD,
Deputy Minister.

No. 25.—Statement showing the transactions in connection with the manufacture of Methylated Spirits, 1900-1901.

Dr.			Cr.		
	Amounts.	Totals.		Amounts.	Totals.
	$ cts.	$ cts.		$ cts.	$ cts.
To Stock on hand, July 1, 1900, viz		9,971 72	By Goods sold as follows		73,675 48
Wood Naphtha, 5117·82 Proof Gallons = 722·72 Std. Galls. American at $1.40	1,018 81		Methylated Spirits, 93,958·58 Proof Galls. = 11,232·10 Std. Galls. at $1·08	12,130 78	
2,025·67 Std. Galls. Canadian at $1.40	3,255 94		35,975·90 " $1.10	39,574 27	
Alcohol, 4,387·52 Proof Galls. at 30c	1,316 26		9,519·03 " $1.50	14,218 08	
Methylated Spirits, 2,911·68 Proof Galls. = 1,108·50 Std. Galls. No. 1 at $1.10	1,219 35		Wood Naphtha, 91·93 Proof Galls. = 55 Std. Galls. at $1.40	77 00	
523·51 " No. 2 at $1.50	785 26		Drums, 241 at $10	2,410 00	
126·00 " Special at $1.10	138 60		Barrels, 2,098 at $2.50	5,245 00	
Drums, 153 at $10.00	1,530 00		Cans, 10 at $1.75 and 1 at 35c	19 25	
Barrels, 283 at $2.50	707 50		Cartage, 75c; Express charges, 35c	1 10	
To Stock sold in 1899-1900 and not paid until after July 1, 1900		1,182 56	By Stock sold and not paid for up to June 30, 1900		1,578 94
Methylated Spirits, 1,589·94 Proof Galls = 246·33 Std. Galls. at $1.08	266 03		Methylated Spirits, 2,081·11 Proof Galls. = 121·51 Std. Galls. at $1.08	131 23	
587·60 " $1.10	646 21		881·51 " $1.10	975 14	
127·08 " $1.50	190 32		248·39 " $1.50	372 57	
Drums, 5	50 00		Drums, 5 at $10	50 00	
Barrels, 12	30 00		Barrels, 20 at $2.50	50 00	
To Disbursements for purchases, &c		50,215 54	By Goods used in manufacture :—		
Alcohol, 4,367·55 Proof Galls. at 32c	1,397 61		Wood Naphtha, 26,898·96 Proof Galls		
69,262·74 " 25c	17,315 72		Alcohol, 69,138·13 Proof Galls		
Wood Naphtha, 28,229·24 Proof Galls. = 16,867·65 Std. Galls. at $1 49	23,614 71		By Sundries as follows—		
Drums, 222 at $10	2,220 00		130 culled drums sold and price included in refunds on debit side		
Barrels, 2,260 at $2.50	5,650 00		92 barrels destroyed		
Cans, 10 at $1.75	17 50				
To other expenses as follows		7,159 08	By Stock on hand, June 30, 1901		8,717 98
Rent of warehouse	800 00		Wood Naphtha, 6,356.17 Proof Galls. = 3,801·56 Std. Galls. at $1.40	5,322 18	
" motor power	165 00		Methylated Spirits, 3,114·99 Proof Galls. = 1,180·66 Std. Galls. No. 1 at $1.10	1,298 73	
Heating	133 50				
Salaries	4,235 55				

Printing		12 96			
Stationery		8 10			
Telephone		40 00			
Freight		244 08			
Sundries, including fitting up new warehouses and purchase of safe, tank and other furniture	$1,558 26				
Less refunds	38 37				
		1,519 89			
Manufactured during the year—					
Methylated Spirits, 94,653·06 Proof Galls.					
Net profit			15,443 50		
Total			83,972 40	Total	83,972 40

505·54	"	No. 2 at $1.50	758 31
194·79	"	Special at $1.10	214 27
Alcohol, 8,879·68 Proof Galls. at 25c.			221 99
Drums, 4 at $10			40 00
Barrels, 345 at $2.50			862 50

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

No. 26.—STATEMENT showing the amounts voted and the Expenditure authorized for each service for the year ended June 30, 1901.

Services.	Grants.	Expenditures.	Over Expenditures.	Under Expenditures.
	$ cts.	$ cts.	$ cts.	$ cts.
Minister's salary	7,000 00	7,000 00		
Departmental salaries	38,220 00	37,285 43		934 57
" contingencies	7,750 00	5,859 70		1,890 30
Excise salaries	312,042 50	307,371 45		4,671 05
" contingencies	50,000 00	50,020 31	20 31	
" " on account of stamps	20,000 00	20,492 09	492 09	
Commission to Custom officers	5,500 00	5,489 83		10 17
Duty pay	6,000 00	5,701 02		298 98
" other than special surveys	1,000 00	641 66		358 34
Cullers' salaries	5,950 00	5,950 00		
" contingencies	3,000 00	2,002 37		997 63
" fees	4,200 00	4,200 00		
" annuities	6,329 05	6,295 73		33 32
Preventive service	13,000 00	11,193 95		1,806 05
Minor revenues	200 00	91 37		108 63
Tobacco stamp commission	100 00	70 78		29 22
Weights and measures salaries	49,060 00	49,787 64	727 64	
" " contingencies	22,241 18	21,270 50		970 68
Gas inspection salaries	16,900 00	16,729 52		170 48
" contingencies and Electric light inspection	15,758 82	15,716 94		41 88
Inspection of staples	19,250 00	14,834 99		4,415 01
Adulteration of food	25,000 00	24,991 37		8 63
Methylated spirits	74,000 00	57,374 62		16,625 38
Metric system supplies	500 00	222 23		277 77
L. A. Fréchette, translation	100 00	27 00		73 00
	703,101 55	670,620 50	1,240 04	33,721 09

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX A

STATISTICS

APPENDIX A—SPIRITS.

No. 1.—Return of Manufactures for

Divisions.	Licenses.		Grain used for Distillation.				
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.	Wheat.
		$	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Belleville, Ont.	1	250	144,800	2,809,120	839,840	28,960	.....
Brantford "	1	250	130	2,300	25	100	275
Guelph "	1	250	212,420	3,744,440	689,930	36,310	12,500
Hamilton "	1	250	120,768	2,337,260	522,642	37,730	.....
Perth "	2	500	243,464	.....	.....	.....	.....
Prescott "	1	250	175,648	3,454,740	679,592	43,680	.....
Toronto "	1	250	579,523	10,262,298	2,248,140	126,200	.....
Windsor "	1	250	1,328,988	10,092,000	1,824,970	126,150	.....
Joliette, Que	1	250	778,560	563,130	767,610	.....	.....
Totals	10	2,500	3,584,301	33,265,288	7,572,749	399,130	12,775

Inland Revenue Department,
Ottawa, August 10, 1901.

the Year ended June 30, 1901.

Barley.	Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory, including License Fees.
Lbs.	Lbs.	Galls.	Galls.	$ cts.	$ cts.
.....	3,822,720	229,328·73	.....	.....	250 00
.....	2,830	81·75	59·27	112 61	362 61
.....	4,695,600	263,334·23	104·28	198 13	448 13
.....	3,018,400	174,249·48	.....	.....	250 00
.....	243,464	13,132·51	21·12	40 55	540 55
.....	4,353,660	254,745·54	.....	.....	250 00
37,380	13,253,541	803,693·70	.....	.....	250 00
.....	13,372,108	804,936·52	729·00	2,317 25	2,567 25
.....	2,109,300	109,206·39	.....	.....	250 00
37,380	44,871,623	2,652,708·85	913·67	2,668 54	5,168 54

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

No. 2.—COMPARATIVE STATEMENT of Manufactures

PROVINCES.	LICENSES.		GRAIN USED FOR DISTILLATION.			
	No.	Fees.	Malt.	Indian Corn.	Rye.	Oats.
1900.		$	Lbs.	Lbs.	Lbs.	Lbs.
Ontario	9	2,125	2,348,154	33,125,464	6,897,759	421,618
Quebec	1	250	785,990	611,806	692,500	.....
Totals	10	2,375	3,134,144	33,737,264	7,590,259	421,618
1901.						
Ontario	9	2,250	2,805,741	32,702,158	6,805,139	399,130
Quebec	1	250	778,560	563,130	767,610	.....
Totals	10	2,500	3,584,301	33,265,288	7,572,749	399,130

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Years ended June 30, 1900 and 1901.

Wheat.	Barley.	Total Grain used for Distillation.	Proof Spirits Manufactured.	Duty Collected ex-Manufactory, on Deficiencies and Assessments.		Total Duty Collected ex-Manufactory including License Fees.
Lbs.	Lbs.	Galls.	Galls.	Galls.	$ cts.	$ cts.
650	26,240	42,819,885	2,550,367·13	493·31	1,203 53	3,328 53
... ...	.....	2,090,290	108,189·92	.....	.....	250 00
650	26,240	44,910,175	2,658,557·05	493·31	1,203 53	3,578 53
12,775	37,380	42,762,323	2,543,502·46	913·67	2,668 54	4,918 54
... .	... .	2,109,300	109,206·39	....	.....	250 00
12,775	37,380	44,871,623	2,652,708·85	913·67	2,668 54	5,168 54

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

No. 3.—STATEMENT showing the transactions in the Distilleries in

DIVISIONS.	Spirits in process, including deficiencies brought forward.	Spirits manufactured during the year, including surpluses.	SPIRITS RETURNED TO DISTILLERY FOR REDISTILLATION.		Spirits received from other sources duty paid.
			Duty paid.	In bond.	
	Galls.	Galls.	Galls.	Galls.	Galls.
Belleville, Ont.	1,596·35	229,328·73			344·09
Brantford "		81·75			
Guelph "	18,207·28	263,334·23		40,969·98	1,276·33
Hamilton "	505·64	174,249·48	279·26	48,347·18	199·96
Perth "	109·06	13,132·51			
Prescott "	26,907·55	254,745·54		575·60	639·06
Toronto "	6,149·27	803,693·70	394·93	222,478·55	3,374·94
Windsor "	56,713·17	804,936·52		96,105·44	24·57
Joliette, Que.	14,030·53	109,206·39			9·30
Totals	124,218·85	2,652,708·85	674·19	408,476·75	5,868·25

INLAND REVENUE DEPARTMENT,

OTTAWA, August 10, 1901.

the Dominion of Canada during the year ended June 30, 1901.

Totals.	Spirits warehoused during the year.	Fusel Oil written off.	Written off.	Deficiencies on which duty was paid.	Spirits in process, including deficiencies carried forward.	Totals.
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
231,269·17	228,613·28	1,093·92	.....	.....	1,561·97	231,269·17
81·75	81·75	.....	.....	.....	.....	81·75
323,787·82	306,008·18	1,280·82	.....	104·28	16,394·54	323,787·82
223,581·52	222,733·11	171·16	.....	.....	677·25	223,581·52
13,241·57	10,066·49	.....	.....	21·12	3,153·96	13,241·57
282,867·75	257,469·51	709·86	1,559·66	.....	23,128·72	282,867·75
1,036,091·39	1,025,731·24	2,944·05	.....	.....	7,416·10	1,036,091·39
957,779·70	905,916·21	2,110·83	.....	721·99	49,030·67	957,779·70
123,246·22	111,299·53	.....	.....	.....	11,946·69	123,246·22
3,191,946·89	3,067,919·30	8,310 64	1,559·66	847·39	113,309·90	3,191,946·89

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 4.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Placed in Warehouse.	Imported.	Received from other Divisions.	Totals.	DIVISIONS.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.		Galls.	$ cts.
666,968·66	228,613·28	.....	9,105·99	904,687·93	Belleville, Ont	62,368·44	118,499 87
6,056·57	81·75	.....	24,961·50	31,099·82	Brantford "	12,575·10	23,892 62
675·86	... .	.....	5,961·94	6,637·80	Cornwall "	6,240·93	11,857 79
881,529·48	306,008·18	.....	97,904·59	1,285,442·25	Guelph "	245,861·06	467,137 45
513,989·74	*8·89 222,733·11	.....	93,497·39	830,229·13	Hamilton "	106,350·77	202,073 81
4,441·55	....	.....	27,739·38	32,180·93	Kingston "	20,798·32	39,516 99
5,140·82	.....	.....	42,587·14	47,727·96	London "	39,996·31	75,995 56
23,081·21	.....	.....	135,402·29	158,483·50	Ottawa "	135,423 22	257,339 65
4,387·52	... .	.....	73,630·29	78,017·81	" Gvt. Wse. "	. .....	.....
....	....	.....	66·62	66·62	" Dep. Lab. "	....	.....
1,496·93	.. . .	.....	9,278·74	10,775·67	Owen Sound "	9,358·22	17,777 66
62,951·93	10,066·49	... .	26,226·84	99,245·26	Perth "	34,394·20	65,516 16
810·54	.....	.. .. ..	16,008·59	16,819·13	Peterboro' "	14,552·74	27,656 85
2,241·11	.....	.....	8,494·05	10,735·16	Port Arthur "	8,492·11	16,134 86
756,721·13	257,469·51	115,937·52	56,821·72	1,186,949·88	Prescott "	31,439·65	94,516 13
2,096·47	.. . .	.....	9,636·29	11,732·76	St. Cath'ines "	10,458·35	19,870 85
1,577·36	....	.....	16,965·70	18,543·06	Stratford "	16,877·73	32,074 29
4,131,581·41	1,025,731·24	‡66·59	124,496·96	5,281,876·20	Toronto "	346,411·97	652,464 67
4,046,599·75	905,916·21	‡7·68 4,160·67	15,369·21	4,972,053·52	Windsor "	180,174·36	341,817 30
11,112,348·04	2,956,619·77 8·89	120,098·19 74·27	794,155·23	14,983,304·39	..Totals.....	1,281,773·48	2,464,142 51
125,624·69	111,299·53	.....	22,025·22	258,949·44	Joliette, Que.	23,704·56	45,076 49
58,484·32	.....	†4·50	696,984·02	755,472·84	Montreal "	581,104·39	1,095,247 86
23,978·38	....	.....	247,265·31	271,243·69	Quebec "	223,374·93	424,472 91
1,592·33	.....	..... .	75,639·11	77,231·44	St. Hya'nthe "	40,832·92	77,593 07
9,552·62	.....	35,018·87	69,686 82	114,258·31	Sherbrooke "	67,334·75	138,443 64
967·30	....	.....	15,335·99	16,303·29	Sorel "	15,381·60	29,230 63
5,592·74	.....	... .	35,841·92	41,434·66	ThreeRivers "	34,418·48	65,400 83
2,697·61	... .	.....	14,841·17	17,538·78	Victoriaville "	12,960·43	24,626 04
228,489·99	111,299·53	35,018·87 4·50	1,177,619·56	1,552,432·45	..Totals	999,112·06	1,900,091 47
7,333·50	.....	.....	79,776·36	87,109·86	St. John, N.B.	67,841·08	128,898 30
6,489·32	.....	.....	36·549·03	43,038·35	Halifax, N.S..	35,576·95	67,596 32
329·10	.....	.....	1,016·78	1,345·88	Charlot'n, PEI	1,035·90	1,968 21
30,366·18	... .	.....	157,588·12	187,954·30	Winnipeg, Mn.	153,273·03	291,223 66
6,543·90	....	.....	15,132·27	21,676·17	Calgary, NWT	15,538·21	29,522 89
39,737·10	....	‡90·46	83,627·48	123,455·04	Vanc'ver, B.C.	90,763·10	172,451 13
19,877·72	.....	..... .	71,245·83	91,123·55	Victoria "	63,005·59	119,712 09
59,614·82	. .. .	90·46	154,873·31	214,578·59	..Totals.....	153,768·69	292,163 22
8,612·54	....	.....	....	8,612·54	Sundries.....	..... .	....
11,460,127·39	3,067,919·30 8·89	155,117·06 169·23	2,416,710·66	17,100,052·53	Grand Totals..	2,707,919·40	§5,175,606 58

* Surplus. † Seizure. ‡ Rewarehoused. § This amount includes $46,535.13 collected on imported spirits used in Bonded Factories at 30c. per gallon.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Year ended June 30, 1901. CR.

Removed in Bond.		Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
184,937·35	...	3,787·86	282·55	1,478·62	...	651,833·11	904,687·93
...	...	...	...	...	14,433·98	4,090·74	31,099·82
...	...	...	...	...	...	396·87	6,637·80
101,966·28	40,969·98	18,172·16	1,226·81	7,951·96	...	869,294·00	1,285,442·25
140,905·35	48,347·18	6,713·96	459·54	514·22	29,723·72	497,214·29	830,229·13
...	...	...	...	9·53	7,555·93	3,817·15	32,180·93
...	...	...	...	133·52	...	7,598·13	47,727·96
...	...	...	16·38	...	...	23,043·90	158,483·50
...	...	...	...	...	‖69,138·13	8,879·68	78,017·81
...	...	...	66·62	...	...	...	66·62
...	...	...	...	...	...	1,417·45	10,775·67
1,480·43	...	577·38	...	...	...	62,793·25	99,245·26
...	...	...	...	...	...	2,266·39	16,819·13
...	...	...	...	...	...	2,243·05	10,735·16
310,992·60	575·60	5,323·81	733·41	1,973·77	115,937·52	719,973·52	1,186,949·88
...	...	...	...	129·24	...	1,145·17	11,732·76
...	...	...	...	...	...	1,665·33	18,543·06
895,315·85	222,478·55	29,561·84	1,638·86	6,012·12	50,965·57	3,729,491·44	5,281,876·20
686,055·66	96,105·44	73,361·50	478·43	126,863·78	4,160·67	3,804,853·68	4,972,053·52
2,321,653·52	408,476·75	137,498·51	4,902·60	145,066·86	222,777·39 ‖69,138·13	10,392,017·15	14,983,304·39
19,952·00	...	370·34	9·30	...	...	214,913·24	258,949·44
52,577·37	...	...	...	274·10	46,393·17	75,123·81	755,472·84
668·50	...	...	594·00	...	17,950·53	28,655·73	271,243·69
2,854·78	...	...	2·86	...	20,460·59	13,080·29	77,231·44
3,346·59	...	...	...	...	40,481·63	3,095·34	114,258·31
921·69	...	...	...	...	...	...	16,303·29
...	...	...	...	...	...	7,016·18	41,434·66
3,882·22	...	...	...	...	...	696·13	17,538·78
84,203·15	...	370·34	606·16	274·10	125,285·92	342,580·72	1,552,432·45
660·03	...	...	...	...	4,642·04	13,966·71	87,109·86
...	...	...	...	114·97	...	7,346·43	43,038·35
...	...	...	...	...	...	309·98	1,345·88
3,559·30	...	...	...	113·86	...	31,008·11	187,954·30
...	...	...	...	...	...	6,137·96	21,676·17
1,396·10	...	...	...	138·19	...	31,157·65	123,455·04
5,238·56	...	...	...	2,446·28	...	20,433·12	91,123·55
6,634·66	...	...	...	2,584·47	...	51,590·77	214,578·59
...	...	...	...	...	...	8,612·54	8,612·54
2,416,710·66	408,476·75	137,868·85	5,508·76	148,154·26	352,705·35 ‖69,138·13	10,853,570·37	17,100,052·53

‖ Used in the manufacture of methylated spirits at the Government Warehouse, Ottawa.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—SPIRITS.

DR. No. 5.—COMPARATIVE STATEMENT of Warehouse

Remaining in Warehouse from last year.	Placed in Warehouse	Imported.	Received from other Divisions.	Totals.	PROVINCES.	Entered for Consumption.	
Galls.	Galls.	Galls.	Galls.	Galls.	1900.	Galls.	$ cts.
11,559,079·76	*5·46 3,010,314·25	118,483·20	708,613·67	15,396,496·34	Ontario..	1,176,884·45	2,264,290·26
146,617·48	102,686·49	†222·15 16,485·88	999,684·67	1,265,696·67	Quebec	921,151·66	1,744,815·55
6,273·59	... .	....	66,664·73	72,938·32	N. Brunswick.	61,254·04	116,382·82
8,025·09	... .	....	28,374·30	36,399·39	Nova Scotia...	29,801·95	56,626·02
400·59	.. ..	....	837·38	1,237·97	P. E. Island...	908·87	1,726·83
31,684·80	.....	.....	162,660·39	194,345·19	Manitoba	159,947·36	303,903·97
5,011·37	.....	....	13,989·49	19,000·86	N. W. Territ..	12,456·96	23,668·28
55,286·61	. ...	....	170,230·42	225,517·03	B. Columbia...	161,170·85	306,225·66
8,612·54	.....	....	.....	8,612·54	Sundries	.....	.....
11,820,991·83	5·46 3,113,000·74	222·15 134,969·08	2,151,055·05	17,220,244·31	....Totals.....	2,523,576·14	4,817,639·39
					1901.		
11,112,348·04	*8·89 2,956,619·77	‡74·27 120,098 19	794,155·23	14,983,304·39	Ontario.....	1,281,773·48	2,464,142·51
228,489·99	111,299·53	†4·50 35,018·87	1,177,619·56	1,552,432·45	Quebec.....	999,112·06	1,900,091·47
7,333·50	.....	.....	79,776·36	87,109·86	N. Brunswick..	67,841·08	128,898·30
6,489·32	.....	.....	36,549·03	43,038·35	Nova Scotia...	35,576·95	67,596·32
329·10	.....	.....	1,016·78	1,345·88	P. E. Island...	1,035·90	1,968·21
30,366·18	.....	....	157,588·12	187,954·30	Manitoba	153,273·03	291,223·66
6,543·90	.....	....	15,132·27	21,676·17	N. W. Territ..	15,538·21	29,522·89
59,614·82	.....	‡90·46	154,873·31	214,578·59	B. Columbia...	153,768·69	292,163·22
8,612·54	.....	.....	....	8,612·54	Sundries	.....	.....
11,460,127·39	8·89 3,067,919·30	169·23 155,117·06	2,416,710·66	17,100,052·53	....Totals. ...	2,707,919·40	5,175,606·58

*Surplus. †Seizure. ‡Rewarehoused.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

Returns for the Years ended June 30, 1900 and 1901. Cr.

Removed in Bond.		Free.		Exported.	Used in Bonded Factories.	Remaining in Warehouse.	Totals.
To other Divisions.	To Distillery for Re-distillation.	Legal Allowance.	Other.				
Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.	Galls.
2,100,103·66	470,315·07	122,451·93	6,622·17	135,569·79	‡58,547·04 213,654·19	11,112,348·04	15,396,496·34
46,131·74	....	.....	186·40	518·61	69,218·27	228,489·99	1,265,696·67
330·45	....	.. . .	124·65	3·18	3,892·50	7,333·50	72,938·32
.....	.. ..	.....	.....	108·12	....	6,489·32	36,399·39
.....	.....	.....	.....	.....	.....	329·10	1,237·97
3,559·25	.....	.....	321·75	150·65	.....	30,366·18	194,345·19
.....	....	.....	.....	.....	.....	6,543·50	19,000·86
929·95	.....	.....	1,514·56	2,286·85	.....	59,614·82	225,517·03
... .	.....	.....	....	.....	.....	8,612·54	8,612·54
2,151,055·05	470,315·07	122,451·93	8,769·53	138,637·20	‡58,547·04 286,764·96	11,460,127·39	17,220,244·31
2,321,653·52	408,476·75	137,498·51	4,902·60	145,066·86	‡69,138·13 222,777·39	10,392,017·15	14,983,304·39
84,203·15	.....	370·34	606·16	274·10	125,285·92	342,580·72	1,552,432·45
660·03	.....	.....	.....	.....	4,642·04	13,966·71	87,109·86
..... .	.....	.....	.....	114·97	....	7,346·43	43,038·35
.. ..	.....	. .....	.....	.....	....	309·98	1,345·88
3,559·30	....	....	....	113·86	.....	31,008·11	187,954·30
.....	.....	.....	.....	.....	... .	6,137·96	21,676·17
6,634·66	.....	.....	....	2,584·47	....	51,590·77	214,578·59
.....	.....	.....	....	....	....	8,612·54	8,612·54
2,416,710·66	408,476·75	137,868·85	5,508·76	148,154·26	‡69,138·13 352,705·35	10,853,570·37	17,100,052·53

‡Used in the manufacture of Methylated Spirits at the Government Warehouse, Ottawa.

	1900.	1901.
Total duty collected ex-manufactory and ex-warehouse.....	$ 4,818,842 92	$ 5,178,275 12
" " on licenses.....	2,375 00	2,500 00
Totals.....	$ 4,821,217 92	$ 5,180,775 12

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MALT.

No. 6.—RETURN of Manufactures for the Year ended June 30, 1901.

DIVISIONS.	LICENSES.		Grain placed in Steep.	Malt Manufactured at 1½c. per lb.	Paid duty.	Warehoused.	Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.					
		$	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
Belleville, Ont.	1	50	343,797	271,718	.....	271,718	50 00
Brantford "	2	100	789,482	633,849	.....	633,849	100 00
Guelph "	7	850	8,820,521	7,097,450	.....	7,097,450	850 00
Hamilton "	3	500	6,797,321	5,566,982	.....	5,566,982	500 00
Kingston "	2	250	6,321,924	5,055,058	.....	5,055,058	250 00
London "	3	450	6,179,365	4,956,305	.....	4,956,305	450 00
Ottawa "	1	100	335,555	271,151	.....	271,151	100 00
Owen Sound, Ont.	1	200	3,947,194	3,102,076	.....	3,102,076	200 00
Perth "	2	100	288,825	237,627	.....	237,627	100 00
Peterborough "	2	250	2,624,395	2,054,015	.....	2,054,015	250 00
Prescott "	4	350	1,659,641	1,309,693	.....	1,309,693	350 00
St. Catharines, Ont.	2	100	978,812	789,908	.....	789,908	100 00
Stratford "	1	200	5,936,750	4,835,250	.....	4,835,250	200 00
Toronto "	11	1,425	16,807,845	13,223,879	.....	13,223,879	1,425 00
Windsor "	1	200	3,252,550	2,671,445	.....	2,671,445	200 00
Totals	43	5,125	65,083,977	52,076,406	.....	52,076,406	5,125 00
Montreal, Que.	3	600	11,331,060	9,161,582	.....	9,161,582	600 00
Quebec "	1	150	1,314,274	1,054,988	.....	1,054,988	150 00
Totals	4	750	12,645,334	10,216,570	.....	10,216,570	750 00
Halifax, N.S.	1	150	564,758	454,254	.....	454,254	150 00
Winnipeg, Man.	2	200	1,053,344	816,531	1,104	815,427	216 56
Calgary, N.W.T.	2	250	687,577	532,138	.....	532,138	250 00
Grand Totals	52	6,475	80,034,990	64,095,899	1,104	64,094,795	6,491 56

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—MALT.

No. 7.—COMPARATIVE STATEMENT of Manufactures for the Years ended June 30, 1900 and 1901.

PROVINCES.	LICENSES.		Grain placed in Steep.	Malt manufactured at 1½ cents per lb.	Paid Duty	Warehoused.	Total Duty collected ex-Manufactory including License Fees.
	No.	Fees.					
1900.		$	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.
Ontario	44	5,025	60,075,407	48,339,388	.....	48,339,388	5,025 00
Quebec	4	750	12,870,993	10,408,886	.....	10,408,886	750 00
Nova Scotia	2	150	711,940	576,810	.....	576,810	150 00
Manitoba	2	200	1,921,597	1,531,037	.....	1,531,037	200 00
N. W. Territories	2	150	816,664	640,908	.....	640,908	150 00
Totals	54	6,275	76,396,601	61,497,029	.....	61,497,029	6,275 00
1901.							
Ontario	43	5,125	65,083,977	52,076,406	.....	52,076,406	5,125 00
Quebec	4	750	12,645,334	10,216,570	.....	10,216,570	750 00
Nova Scotia	1	150	564,758	454,254	.....	454,254	150 00
Manitoba	2	200	1,053,344	816,531	1,104	815,427	216 56
N. W. Territories	2	250	687,577	532,138	.....	532,138	250 00
Totals	52	6,475	80,034,990	64,095,899	1,104	64,094,795	6,491 56

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MALT.

DR. No. 8.—WAREHOUSE RETURN

Remaining in Warehouse from last year.	Placed in Warehouse.	Increases.	Received from other Divisions.	Imported.	Totals.	Divisions.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
126,698	271,718	1,456			399,272	..Belleville, Ont....
160,010	633,849	6,222	186,000		986,081	..Brantford " ....
1,787,375	7,097,450	114,627	671,000		9,670,452	..Guelph " ...
1,667,276	5,566,982	63,772	36,000		7,334,030	..Hamilton " ....
1,732,644	5,055,058	42,516			6,830,218	..Kingston " ....
2,245,021	4,956,305	83,521	88,000		7,372,847	..London " ....
259,092	271,151	9,957			540,200	..Ottawa " .. .
377,730	3,102,076	26,622	597,100		4,103,528	..Owen Sound " ....
21,548	237,627	2,296			261,471	..Perth " ....
543,064	2,054,015	27,326	50,800		2,675,205	..Peterborough " ....
23,443			84,730		108,173	..Port Arthur " ....
1,050,916	1,309,693	27,919			2,388,528	..Prescott " ....
142,944	789,908	5,004	174,600		1,112,456	..St. Catharines " ....
1,867,358	4,835,250	16,839	480,500		7,199,947	..Stratford " ....
5,830,237	13,223,879	171,495	340,000		19,565,611	..Toronto " ....
785,608	2,671,445	14,733	711,200	5,067	4,188,053	..Windsor " ....
18,620,364	52,076,406	614,305	3,419,930	5,067	74,736,072	.....Totals.....
2,530		7,785	780,000		790,315	..Joliette, Que.....
4,753,290	9,161,582	161,704	2,417,466	14,704	16,508,746	..Montreal " .... .
64,000	1,054,988		2,723,000		3,841,988	..Quebec " .....
32,550		1,635	1,164,000		1,198,185	..Sherbrooke " ....
4,852,370	10,216,570	171,124	7,084,466	14,704	22,339,234	..... Totals.. .....
60,326			913,000		973,326	..St. John, N.B... ....
199,001	454,254		1,843,000		2,496,255	..Halifax, N.S.....
12,280		790	136,000		149,070	..Charlottetown, P.E.I..
391,860	815,427	16,138	862,000	400	2,085,825	..Winnipeg, Man.....
223,381	532,138	5,481			761,000	..Calgary, N.W.T.....
161,753			82,082	2,022,574	2,266,409	..Vancouver, B.C.....
			160,000	1,522,525	1,682,525	..Victoria " .. .
161,753			242,082	3,545,099	3,948,934	.....Totals.....
24,521,335	64,094,795	807,838	14,500,478	3,565,270	107,489,716	.....Grand totals.....

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Year ended June 30, 1901. CR.

Entered for Consumption at 1½ cents per lb.		Removed to other Divisions.	Exported.	Free and Written off.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
278,428	4,176 42	.....	.....	.....	120,844	399,272
756,666	11,349 99	.....	.....	.....	229,415	986,081
5,100,967	76,514 51	1,967,500	108,000	.....	2,493,985	9,670,452
4,350,130	65,251 95	1,062,200	.....	.....	1,921,700	7,334,030
3,677,114	55,156 71	1,020,466	.....	9,070	2,123,568	6,830,218
4,545,018	68,176 22	90,000	.....	.....	2,737,829	7,372,847
387,172	5,807 58	.....	.....	25,600	127,428	540,200
1,133,636	17,004 54	1,532,730	100,000	16,428	1,320,734	4,103,528
.....	.....	.....	.....	253,368	8,103	261,471
796,428	11,946 42	1,248,000	36,000	.....	594,777	2,675,205
108,173	1,622 58	.....	.....	.....	.....	108,173
1,514,281	22,714 24	30,000	.....	.....	844,247	2,388,528
962,330	14,434 95	.....	.....	.....	150,126	1,112,456
1,867,233	28,008 50	3,298,300	.....	.....	2,034,414	7,199,947
2,535,884	188,038 30	1,778,200	30,000	.....	5,221,527	19,565,611
2,426,856	36,402 83	66,000	.....	799,044	896,153	4,188,053
40,440,316	606,605 74	12,093,396	274,000	1,103,510	20,824,850	74,736,072
.....	.....	.....	.....	778,560	11,755	790,315
9,799,170	146,987 55	2,345,000	36,000	.....	4,328,576	16,508,746
3,710,988	55,664 74	.....	.....	.....	131,000	3,841,988
1,135,785	17,036 78	.....	.....	.....	62,400	1,198,185
14,645,943	219,689 07	2,345,000	36,000	778,560	4,533,731	22,339,234
901,936	13,529 04	.....	.....	.....	71,390	973,326
2,440,255	36,603 84	20,000	.....	.....	36,000	2,496,255
129,070	1,936 05	.....	.....	.....	20,000	149,070
1,890,444	28,356 65	.....	.....	.....	195,381	2,085,825
568,335	8,525 05	42,082	.....	.....	150,583	761,000
2,063,688	30,955 47	.....	.....	.....	202,721	2,266,409
1,642,525	24,637 68	.....	.....	.....	40,000	1,682,525
3,706,213	55,593 15	.....	.....	.....	242,721	3,948,934
64,722,512	970,838 59	14,500,478	310,000	1,882,070	26,074,656	107,489,716

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MALT.

DR. No. 9.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from last year.	Placed in Warehouse.	Increases.	Received from other Divisions.	Imported.	Totals.	PROVINCES.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	1900.
16,662,000	48,339,388	556,706	3,043,536	39,873	68,641,503	..Ontario.....
4,042,158	10,408,886	141,069	4,216,000	43,128	18,851,241	..Quebec.....
30,000	.....	.....	835,290	....	865,290	..New Brunswick.....
102,195	576,810	2,335	1,944,330	....	2,625,670	..Nova Scotia... .....
3,600	....	....	130,000	....	133,600	..Prince Edward Island.
398,223	1,531,037	21,311	514,000	.....	2,464,571	..Manitoba .....
234,048	640,908	9,378	....	....	884,334	..N. W. Territories.....
309,963	....	.....	950,712	2,703,629	3,964,304	..British Columbia ... .
21,782,187	61,497,029	730,799	11,633,868	2,786,630	98,430,513	.....Totals..... .
						1901.
18,620,364	52,076,406	614,305	3,419,930	5,067	74,736,072	..Ontario.....
4,852,370	10,216,570	171,124	7,084,466	14,704	22,339,234	..Quebec.....
60,326	....	.. ..	913,000	.....	973,326	..New Brunswick. ....
199,001	454,254	.....	1,843,000	....	2,496,255	..Nova Scotia.....
12,280	.....	790	136,000	.....	149,070	..Prince Edward Island.
391,860	815,427	16,138	862,000	400	2,085,825	..Manitoba.... .....
223,381	532,138	5,481	... ...	.....	761,000	..N. W. Territories. ...
161,753	.....	....	242,082	3,545,099	3,948,934	..British Columbia.....
24,521,335	64,094,795	807,838	14,500,478	3,565,270	107,489,716	.....Totals.....

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Years ended June 30, 1900 and 1901. CR.

Entered for Consumption at 1½ cents per lb.		Removed to other Divisions.	Exported.	Free, and Written off.	Remaining in Warehouse.	Totals.
Lbs.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
39,295,279	589,431 00	9,521,956	327,950	875,954	18,620,364	68,641,503
11,442,881	171,643 14	1,770,000	.....	785,990	4,852,370	18,851,241
804,964	12,074 46	.....	.....	.....	60,326	865,290
2,408,669	36,130 05	18,000	.....	.....	199,001	2,625,670
121,320	1,819 80	.....	.....	.....	12,280	133,600
1,933,511	29,002 66	139,200	.....	.....	391,860	2,464,571
475,489	7,132 36	184,712	.....	752	223,381	884,334
3,801,951	57,029 34	.....	.....	600	161,753	3,964,304
60,284,064	904,262 81	11,633,868	327,950	1,663,296	24,521,335	98,430,513
40,440,316	606,605 74	12,093,396	274,000	1,103,510	20,824,850	74,736,072
14,645,943	219,689 07	2,345,000	36,000	778,560	4,533,731	22,339,234
901,936	13,529 04	.....	.....	.....	71,390	973,326
2,440,255	36,603 84	20,000	.....	.....	36,000	2,496,255
129,070	1,936 05	.....	.....	.....	20,000	149,070
1,890,444	28,356 65	.....	.....	.....	195,381	2,085,825
568,335	8,525 05	42,082	.....	.....	150,583	761,000
3,706,213	55,593 15	.....	.....	.....	242,721	3,948,934
64,722,512	970,838 59	14,500,478	310,000	1,882,070	26,074,656	107,489,716

	1900	1901
Total duty collected ex-manufactory and ex-warehouse	$ 904,262 81	$ 970,855 15
" " on licenses	6,275 00	6,475 00
Totals	$ 910,537 81	$ 977,330 15

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MALT LIQUOR.

No. 10.—RETURN of Manufactures for the Year ended June 30, 1901.

DIVISIONS.	LICENSES. No.	LICENSES. Fees.	Malt used.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
		$	Lbs.	Lbs.	Galls.	Galls.	$ cts.
Belleville, Ont	1	50	135,561		58,225		50 00
Brantford, "	3	150	758,678		301,960		150 00
Guelph, "	7	350	4,803,336		1,948,765		350 00
Hamilton, "	3	150	3,210,879		1,463,921		150 00
Kingston, "	2	100	483,812		155,450		100 00
London, "	6	300	4,792,974		1,844,686	1,066½	300 00
Ottawa, "	2	100	707,028		271,275		100 00
Owen Sound, "	6	300	1,163,467		469,980		300 00
Peterborough, "	4	200	853,983		294,220	237	200 00
Port Arthur, "	1	50	103,192		48,128		50 00
Prescott, "	3	150	1,306,376		424,825		150 00
St. Catharines, "	2	100	995,802		370,975		100 00
Stratford, "	5	250	597,279		277,950		250 00
Toronto, "	13	650	12,292,160		5,281,509		650 00
Windsor, "	3	150	1,790,262		839,701	1,014	150 00
Totals	61	3,050	33,994,789		14,051,570	2,317½	3,050 00
Joliette, Que	1	50	9,425		3,020		50 00
Montreal, "	11	525	14,132,523		5,474,145		525 00
Quebec, "	4	200	3,668,028		1,345,290		200 00
St. Hyacinthe, "	*		18,845		8,080		
Sherbrooke, "	2	100	1,174,004		532,000		100 00
Totals	18	875	19,002,825		7,362,535		875 00
St. John, N.B.	2	100	1,302,836		480,700		100 00
Halifax, N.S.	4	200	2,407,615		843,066	117,767	200 00
Charlottetown, P.E.I.	1	50	129,080		44,900		50 00
Winnipeg, Man.	7	325	1,895,774		678,946		325 00
Calgary, N.W.T.	4	200	551,606		207,045		200 00
Vancouver, B.C.	28	1,400	2,087,995	483	875,921		1,450 40
Victoria "	6	300	1,621,016	508	563,571	53,036	318 50
Totals	34	1,700	3,709,011	991	1,439,492	53,036	1,768 90
Grand Totals	131	6,500	62,993,536	991	25,108,254	173,120½	6,568 90

*License fee included in Sherbrooke.

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—MALT LIQUOR.

No. 11.—Comparative Statement of Manufactures for the Years ended June 30, 1900 and 1901.

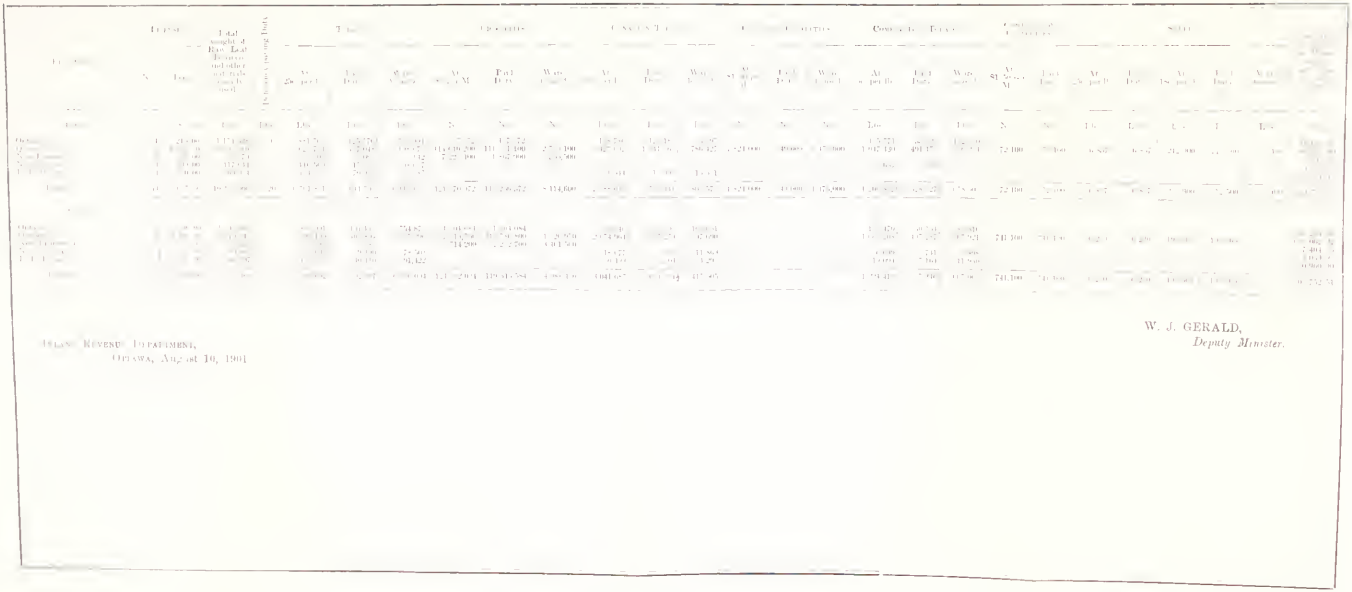
Provinces.	Licenses. No.	Licenses. Fees.	Malt used.	Other commodities used.	Malt Liquor manufactured.	Malt Liquor exported and used by H. M. Army and Navy.	Total Duty collected, including License Fees.
1900.		$	Lbs.	Lbs.	Galls.	Galls.	Galls.
Ontario	63	3,100	32,723,148	.....	13,255,566	3,761	3,100 00
Quebec	18	900	16,577,841	.....	6,306,869	705	900 00
New Brunswick	2	100	1,189,364	.....	438,820	.....	100 00
Nova Scotia	4	200	2,641,081	.....	916,843	176,486	200 00
Prince Edward Island	1	50	121,320	.....	42,000	.....	50 00
Manitoba	7	350	1,904,007	.....	687,868	.....	350 00
N. W. Territories	3	150	430,045	.....	157,020	.....	150 00
British Columbia	37	1,825	3,894,922	9,351	1,504,186	38,282	2,323 90
Totals	135	6,675	59,481,728	9,351	23,309,172	219,234	7,173 90
1901.							
Ontario	61	3,050	33,994,789	.....	14,051,570	2,317½	3,050 00
Quebec	18	875	19,002,825	.....	7,362,535	.....	875 00
New Brunswick	2	100	1,302,836	.....	480,700	.....	100 00
Nova Scotia	4	200	2,407,615	.....	843,066	117,767	200 00
Prince Edward Island	1	50	129,080	.....	44,900	.....	50 00
Manitoba	7	325	1,895,774	.....	678,946	.....	325 00
N. W. Territories	4	200	551,606	.....	207,045	.....	200 00
British Columbia	34	1,700	3,709,011	991	1,439,492	53,036	1,768 90
Totals	131	6,500	62,993,536	991	25,108,254	173,120½	6,568 90

	1900.	1901.
	Galls.	Galls.
Exported	4,969	2,641½
Used by H. M. Army and Navy	214,265	170,479
Totals	219,234	173,120½

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

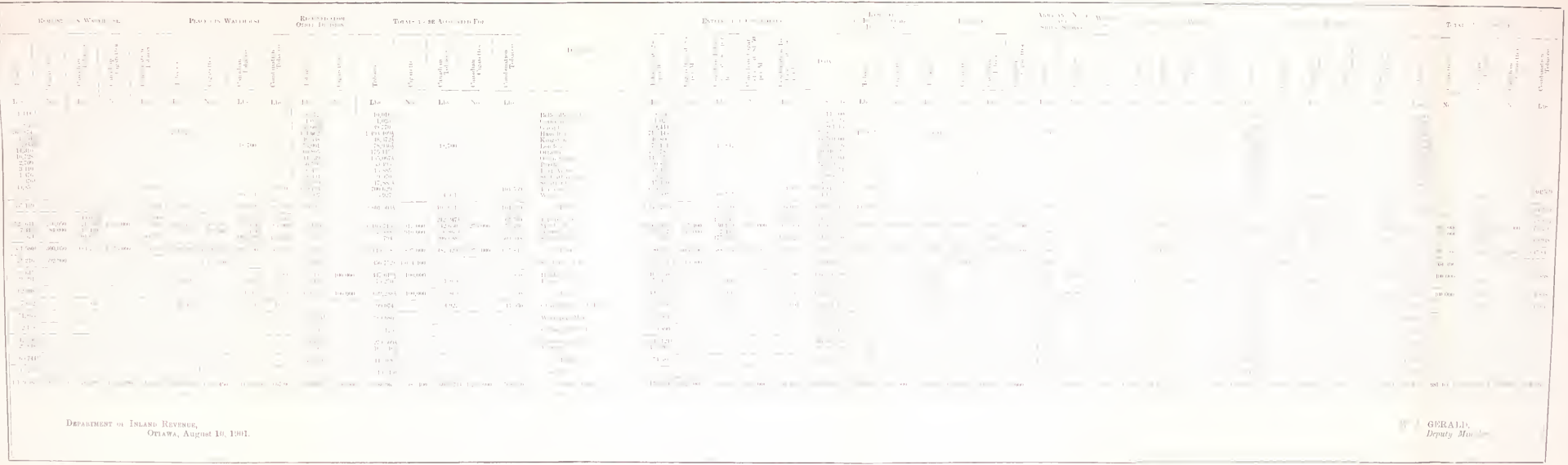
No. 13.—Comparative Statement of Manufactures for the Years ended June 30, 1900 and 1901.



W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

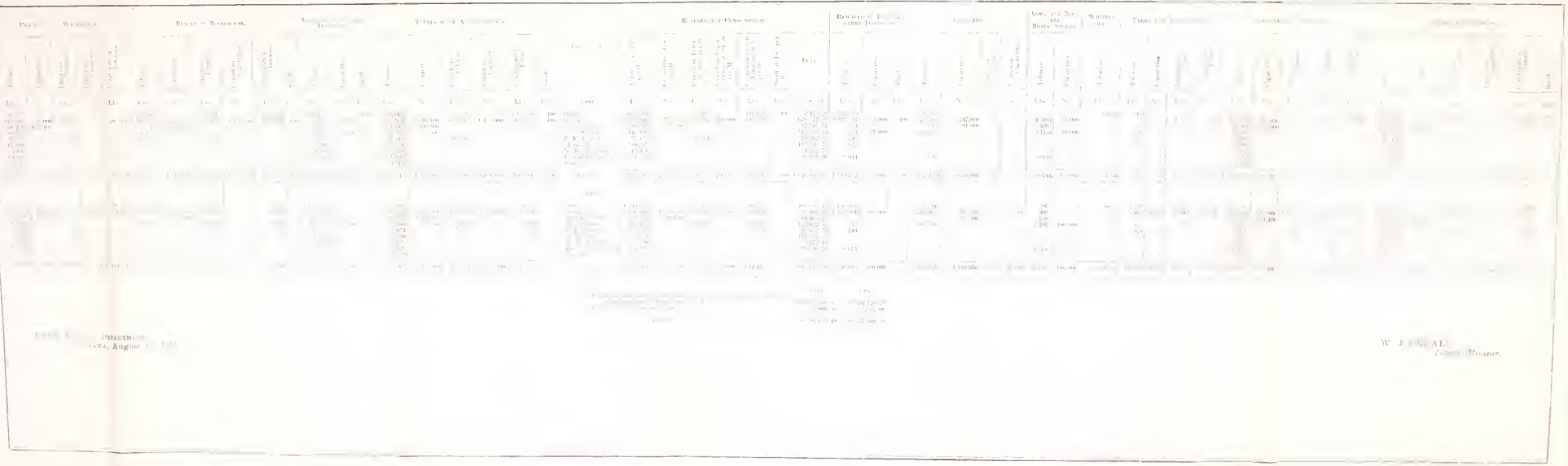
Dr. No. 14.—Warehouse Returns for the Year ended June 1901. Cr.



Department of Inland Revenue,
Ottawa, August 10, 1901.

GERALD
Deputy Min

Dr. No. 15.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended June 30, 1906 and 1907. Cr.



DEPARTMENT OF INLAND REVENUE,
OTTAWA, August [illegible], 1907.

W. J. GERALD,
Deputy Minister.

DR. No. 16.—WAREHOUSE RETURN for the Year ended June 30, 1901. CR.

Remaining in Warehouse from last Year.	Placed in Warehouse.	Received from other Divisions.	Totals.	DIVISIONS.	Entered for Consumption.		Removed in Bond to other Divisions.	Exported.	Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse	Totals.
					Quantity.	Duty.							
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.		Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
424	2,802	7,237	10,463	Belleville, Ont..	8,121	812 10	424	.....	.....	445	107	1,366	10,463
14,312	66,200	1,291	81,803	Brantford " ..	67,264	6,726 40	1,814	3,895	.....	.....	200	8,635	81,803
25,101	94,453	897	120,451	Guelph " ..	92,199	9,219 90	5,974	776	135	.....	1,649	19,718	120,451
983,509¼	1,041,716¼	1,555½	2,026,781	Hamilton " ..	1,185,801½	118,608 75	10,577	148,597	107	.....	30,973½	650,725	2,026,781
61,741	88,921	2,326	152,988	Kingston " ..	73,249	7,370 82	13,540	.....	.....	.....	915	65,284	152,988
176,012	504,868½	14,688½	695,569	London " ..	484,274½	48,992 81	18,126	21,013	.....	.....	11,527½	160,628	695,569
1,676	2,418½	5,256	9,350½	Ottawa " ..	3,061	306 10	2,887½	.....	.....	3,141	261	.....	9,350½
959	9,013	.....	9,972	Owen Sound " ..	8,214	821 40	500	157	.....	.....	.....	1,101	9,972
557	1,421	774¼	2,752¼	Perth " ..	2,376¼	237 63	.....	.....	.....	.....	.....	376	2,752¼
334	1,752	1,673	3,759	Peterborough " ..	1,453	145 30	.....	.....	.....	1,673	.....	633	3,759
2,769	9,363	3,064	15,196	Prescott " ..	12,171	1,219 90	.....	.....	.....	.....	.....	3,025	15,196
15,806	28,892	973	45,671	St. Catharines " ..	24,276	2,432 50	4,668	2,634	.....	40	327	13,726	45,671
14,083	44,439	432	58,954	Stratford " ..	34,177	3,417 70	1,906	.....	82	.....	.....	22,789	58,954
123,167½	204,061½	4,701¼	331,930½	Toronto " ..	188,964¼	26,431 39	16,198	10,992	49	305	2,727	112,695	331,930½
10,724	35,316½	693	46,733½	Windsor " ..	34,346½	3,439 69	1,261	1,083	.....	.....	.....	10,043	46,733½
1,431,174¾	2,135,637¼	45,561½	3,612,373½	.... Totals.....	2,219,948	230,182 39	77,875½	189,142	373	5,604	48,687	1,070,744	3,612,373½
42,715	2,185	4,709	49,609	Joliette, Que..	7,303	2,190 90	21,054	.....	.....	.....	.....	21,252	49,609
3,821,299½	7,398,213¼	115,010	11,334,522¾	Montreal " ..	6,753,634¼	690,466 82	75,051½	134,190	.....	448	210,449¾	4,160,749¼	11,334,522¾
66,836	206,102½	25,087	298,025½	Quebec " ..	196,545½	22,503 39	6,131½	.....	.....	467	22,999	71,882½	298,025½
.....	10,947	32,564½	43,511½	St. Hyacinthe " ..	14,322½	1,432 21	347	.....	425	.....	7,534	20,883	43,511½
146,318	169,475	16,101	331,894	Sherbrooke " ..	168,642	28,495 16	22,766	.....	.....	.....	5,829½	134,656½	331,894
3,717	10,770	1,784½	16,271½	Three Rivers " ..	14,048½	1,404 85	.....	.....	.....	.....	.....	2,223	16,271½
41,131	3,546	216	44,893	Victoriaville " ..	21,912	2,191 20	22,981	.....	.....	.....	.....	.....	44,893
4,122,016½	7,801,238¾	195,472	12,118,727¼	..... Totals.....	7,176,407¾	748,684 53	148,331	134,190	425	915	246,812¼	4,411,646¼	12,118,727¼

19,672	37,676	5,922½	63,270½	St. John, N.B ...	40,677	5,115 06	320	712	.....	.....	1,470	20,091½	63,270½
9,676½	9,529	320	19,525½	Halifax, N.S.....	11,408½	1,204 61	.....	.....	.....	.....	101	8,016	19,525½
10,085	102,113	.....	112,198	Pictou "	82,774	8,277 40	.....	.....	.....	24	.....	29,400	112,198
19,761½	111,642	320	131,723½	.....Totals.....	94,182½	9,482 01	.....	.....	.....	24	101	37,416	131,723½
55,944	141,422	....	197,366	Charlottetown, P.E.I.	132,611	13,822 90	.....	.....	.....	.....	.....	64,755	197,366
47,989	96,770	1,779	146,538	Winnipeg, Man...	79,979	8,004 26	9,212	1,937	.....	.....	414	54,996	146,538
....	2,144	.....	2,144	Calgary, N.W.T..	920	92 00	.....	.....	.....	.....	.....	1,224	2,144
23,308½	88,078	3,256	114,642½	Vancouver, B.C...	65,243	6,975 82	14,776½	897	.....	.....	.....	33,726	114,642½
7,176	43,846	1,258	52,280	Victoria " ..	38,835½	3,906 75	3,054	1,089	.....	.....	375½	8,926	52,280
30,484½	131,924	4,514	166,922½	. . . .Totals.....	104,078½	10,882 57	17,830½	1,986	.....	.....	375½	42,652	166,922½
5,727,042¼	10,458,454	253,569	16,439,065¼	...Grand Totals...	9,848,803¾	1,026,265 72	253,569	327,967	798	6,543	297,859¾	5,703,524¾	16,439,065¼

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued.*—RAW LEAF TOBACCO, INCLUDING STEMS, SCRAPS AND CUTTINGS.

DR. No. 17.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended June 30, 1900 and 1901. CR.

Remaining in Warehouse from last year.	Placed in Warehouse	Received from other Divisions.	Totals.	PROVINCES.	ENTERED FOR CONSUMPTION.		Removed to other Divisions.	Exported.	Free and Written off.	Taken for Horticultural purposes, and destroyed.	Re-entered for Manufacture.	Remaining in Warehouse.	Totals.
					Quantity.	Duty.							
Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	1900.	Std. lbs.	$ cts.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.	Std. lbs.
1,239,655	2,560,992	48,373½	3,849,020½	Ontario	2,134,088	220,076 70	30,948½	233,899½	368	10,709½	7,832	1,431,174¾	3,849,020¼
4,507,834¼	6,637,448	76,310½	11,221,592¾	Quebec	6,728,396	701,829 47	90,897½	133,372¼	15,900	2,154	128,856½	4,122,016½	11,221,592¾
21,893	42,016	2,445	66,354	New Brunswick	44,152	4,905 60	1,146	.....	10	550	824	19,672	66,354
75,283½	58,056	2,358	135,697½	Nova Scotia	114,719	11,521 04	.....	.....	930	27	260	19,761½	135,697½
84,587	96,867	.....	181,454	P. E. Island	125,510	12,551 00	.....	.....	.....	.....	.....	55,944	181,454
32,936	131,416¼	291¾	164,644	Manitoba	103,518	10,351 80	5,556	7,581	.....	.....	.....	47,989	164,644
35,682	104,965	107½	140,754½	B. Columbia	102,152	10,741 99	1,338	6,780	.....	.....	.....	30,484½	140,754½
5,997,870¾	9,631.760¼	129,886	15,759,517	....Totals	9,352,535	971,977 60	129,886	381,632¾	17,208	13,440½	137,772½	5,727,042¼	15,759,517
				1901.									
1,431,174¾	2,135,637¼	45,561½	3,612,373½	Ontario	2,219,948	230,182 39	77,875½	189,142	373	5,604	48,687	1,070,744	3,612,373½
4,122,016½	7,801,238¾	195,472	12,118,727¼	Quebec	7,176,407¾	748,684 53	148,331	134,190	425	915	246,812¼	4,411,646½	12,118,727¼
19,672	37,676	5,922½	63,270½	New Brunswick	40,677	5,115 06	320	712	.....	.....	1,470	20,091½	63,270½
19,761½	111,642	320	131,723½	Nova Scotia	94,182½	9,482 01	.....	.....	.....	24	101	37,416	131,723½
55,944	141,422	.....	197,366	P. E. Island	132,611	13,822 90	.....	.....	.....	.....	.....	64,755	197,366
47,989	96,770	1,779	146,538	Manitoba	79,979	8,004 26	9,212	1,937	.....	.....	414	54,996	146,538
.....	2,144	.....	2,144	N. W. Territories	920	92 00	.....	.....	.....	.....	.....	1,224	2,144
30,484½	131,924	4,514	166,922½	B. Columbia	104,078½	10,882 57	17,830½	1,986	.....	.....	375½	42,652	166,922½
5,727,042¼	10,458,454	253,569	16,439,065¼	....Totals	9,848,803¾	1,026,265 72	253,569	327,967	798	6,543	297,859¾	5,703,524¾	16,439,065¼

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—CANADA TWIST TOBACCO.

No. 18.—Statement of Revenue collected from Canada Twist Tobacco for the Year ended June 30, 1901.

Divisions.	Licenses. No.	Licenses. Fees.	Canada Twist, at 5 cts. per pound.	Duty collected, including License Fees.
		$	Lbs.	$ cts.
Belleville, Ont.	1	2	290	16 50
Cornwall "	5	10	1,990	109 50
Ottawa "	13	25	3,753	212 65
Prescott "	1	2	420	23 00
Totals	20	39	6,453	361 65
Joliette, Que.	17	22	24,385	1,241 25
Montreal "	38	76	26,759	1,413 95
Totals	55	98	51,144	2,655 20
Grand Totals	75	137	57,597	3,016 85

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

CANADA TWIST TOBACCO.

No. 19.—Comparative Statement for Years ended June 30, 1900 and 1901.

Years.	Provinces.	Licenses. No.	Licenses. Fees.	Canada Twist, at 5 cts. per pound.	Duty collected, including License Fees.
				Lbs.	$ cts.
1900	Ontario	16	31	8,261	444 05
	Quebec	67	132	50,653	2,664 65
	Totals	83	163	58,914	3,108 70
1901	Ontario	20	39	6,453	361 65
	Quebec	55	98	51,144	2,655 20
	Totals	75	137	57,597	3,016 85

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

APPENDIX A—*Continued*—CIGARS.

No. 20.—RETURN of Manufactures

DIVISIONS.	LICENSES.		Total weight of Raw Leaf Tobacco and all other materials actually used.	Deficiencies paying duty.	CIGARS AT $7 PER THOUSAND.		CIGARS
	No.	Fees.			Produced.	Paid Duty.	Produced.
		$ cts.	Lbs.	No.	No.	No.	No.
Belleville, Ont	1	75 00	6,461	.....	.....	.....	382,350
Brantford "	8	600 00	62,539	.....	1,200	1,200	3,567,045
Guelph "	13	937 50	89,290	.....	.....	.....	5,630,920
Hamilton "	14	1,050 00	143,803	.....	.....	.....	8,113,620
Kingston "	2	150 00	66,932	.....	.....	.....	4,014,225
London "	20	1,500 00	464,124	.....	.....	.....	28,476,910
Ottawa "	1	75 00	2,366½	.....	.....	.....	126,750
Owen Sound "	2	150 00	7,774	.....	.....	.....	427,950
Perth "	1	75 00	2,104¾	.....	.....	.....	117,030
Peterborough, Ont	1	75 00	1,591	.....	.....	.....	108,250
Prescott "	4	300 00	12,318	.....	.....	.....	730,650
St. Catharines "	10	712 50	21,129	.....	.....	.....	1,297,325
Stratford "	3	225 00	32,686	990	.....	.....	1,707,700
Toronto "	20	1,462 50	140,078¾	.....	.....	.....	8,140,835
Windsor "	6	450 00	32,788½	.....	.....	.....	1,900,420
Totals	106	7,837 50	1,085,985	990	1,200	1,200	64,741,980
Joliette, Que	2	75 00	26,658	.....	.....	.....	.....
Montreal "	35	2,530 00	909,461¼	1,509	2,970	2,970	45,170,815
Quebec "	7	490 00	72,704⅕	425	.....	.....	3,716,055
St. Hyacinthe, Que	2	125 00	51,443⅕	*1,300	2,004	2,004	970,330
Sherbrooke "	5	350 00	109,707½	.....	.....	.....	6,234,510
Three Rivers "	2	150 00	14,253½	.....	.....	.....	789,255
Victoriaville "	1	75 00	†	.....	.....	.....	1,187,810
Totals	54	3,795 00	1,184,228¼	3,234	4,974	4,974	58,068,775
St. John, N.B.	6	382 50	67,843	.....	.....	.....	603,790
Halifax, N.S	3	225 00	11,149½	.....	.....	.....	672,800
Winnipeg, Man	8	562 50	71,480	.....	.....	.....	4,056,190
Calgary, N.W.T	2	75 00	601	.....	.....	.....	33,350
Vancouver, B.C.	15	927 50	61,785½	.....	.....	.....	2,852,800
Victoria "	12	890 00	33,628	‡3,436	.....	.....	1,699,625
Totals	27	1,817 50	95,413½	‡3,436	.....	.....	4,552,425
Grand Totals	206	14,695 00	2,516,700¼	7,660	6,174	6,174	132,729,310

† Victoriaville merged in St. Hyacinthe May 11, 1901.
* Deficiency on Canadian cigars at $3 per M.
‡ " Combination " "

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Year ended June 30, 1901.

At $6 per Thousand.		Canadian Cigars at $3 per Thousand.			Combination Cigars at $3 per Thousand.			Total Duty Collected ex-Manufactory, including License Fees.
Paid Duty.	Warehoused	Produced.	Paid Duty.	Warehoused.	Produced.	Paid Duty.	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
140,500	241,850							918 00
2,269,145	1,297,900							14,223 27
2,708,375	2,922,545							17,187 75
3,434,405	4,679,215							21,656 43
1,626,000	2,388,225							9,906 00
19,016,740	9,460,170							115,600 44
25,850	100,900							230 10
139,000	288,950							984 00
22,500	94,530							210 00
67,850	40,400							482 10
471,350	259,300							3,128 10
1,166,075	131,250							7,708 95
1,642,650	65,050							10,086 84
4,749,375	3,391,460							29,958 75
1,098,220	802,200							7,039 32
38,578,035	26,163,945							239,320 05
		1,489,450	1,267,150	222,300				3,876 45
21,102,235	24,068,580				2,929,900	2,103,200	826,700	135,482 87
1,735,675	1,980,380	105,600	105,600		391,900	210,100	181,800	11,853 70
287,600	682,730	496,580	496,580					3,358 26
3,239,280	2,995,230	68,600	68,600					19,991 48
331,920	457,335							2,141 52
554,840	632,970							3,404 04
27,251,550	30,817,225	2,160,230	1,937,930	222,300	3,321,800	2,313,300	1,008,500	180,108 32
236,040	367,750				2,793,140	815,340	1,977,800	4,244 76
291,240	381,560							1,972 44
1,503,125	2,553,065							9,581 25
24,550	8,800							222 30
2,645,700	207,100				370,900	310,900	60,000	17,734 40
1,335,575	364,050				48,900	33,400	15,500	9,013 95
3,981,275	571,150				419,800	344,300	75,500	26,748 35
71,865,815	60,863,495	2,160,230	1,937,930	222,300	6,534,740	3,472,940	3,061,800	462,197 47

W. J. GERALD,
Deputy Minister.

APPENDIX A--*Continued*—CIGARS.

DR. No. 21.—COMPARATIVE STATEMENT of Manufactures

PROVINCES.	LICENSES.		Total weight of Raw Leaf Tobacco and all other materials actually used.	Deficiencies paying Duty.	CIGARS AT $7 PER THOUSAND.			CIGARS
	No.	Fees.			Produced.	Paid Duty.	Warehoused.	Produced.
1900.		$ cts.	Lbs.	No.	No.	No.	No.	No.
Ontario	105	7,762 50	1,041,636½	50	7,200	6,000	1,200	62,200,395
Quebec	56	3,755 00	1,209,666$\frac{13}{20}$	8,380	690	690		60,105,250
New Brunswick	4	247 50	36,782					765,850
Nova Scotia	3	225 00	10,435					615,360
Manitoba	7	525 00	92,686					5,214,145
British Columbia	21	1,515 00	94,370		2,202	2,202		4,696,575
Totals	196	14,030 00	2,485,576$\frac{9}{20}$	8,430	10,092	8,892	1,200	133,597,575
1901.								
Ontario	106	7,837 50	1,085,985	990	1,200	1,200		64,741,980
Quebec	54	3,795 00	1,184,228¼	*3,234	4,974	4,974		58,068,775
New Brunswick	6	382 50	67,843					603,790
Nova Scotia	3	225 00	11,149½					672,800
Manitoba	8	562 50	71,480					4,056,190
N.-W. Territories	2	75 00	601					33,350
British Columbia	27	1,817 50	95,413½	†3,436				4,552,425
Totals	206	14,695 00	2,516,700¼	7,660	6,174	6,174		132,729,310

* 1,300 of these cigars were manufactured from Canadian leaf at $3 per M.
† Combination cigars at $3 per M.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Years ended June 30, 1900 and 1901. CR.

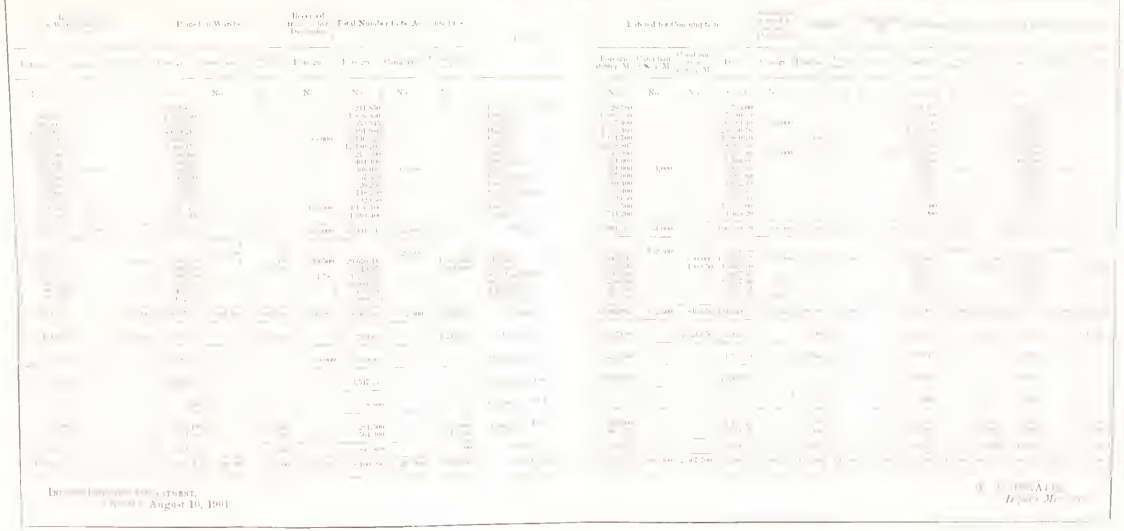
At $6 per Thousand.		Canadian Cigars at $3 per Thousand.			Combination Cigars at $3 per Thousand.			Total Duty collected ex-Manufactory including License Fees.
Paid Duty.	Warehoused	Produced.	Paid Duty	Warehoused.	Produced.	Paid Duty	Warehoused.	
No.	No.	No.	No.	No.	No.	No.	No.	$ cts.
36,736,315	25,464,080							228,222 69
27,891,220	32,214,030	1,539,340	1,234,890	304,450	2,652,070	1,939,370	712,700	180,680 24
207,100	558,750				1,169,450	195,900	973,550	2,077 80
278,860	336,500							1,898 16
1,395,745	3,818,400							8,899 47
4,166,800	529,775	21,700	21,700		399,250	399,250		27,794 07
70,676,040	62,921,535	1,561,040	1,256,590	304,450	4,220,770	2,534,520	1,686,250	449,572 43
38,578,035	26,163,945							239,320 05
27,251,550	30,817,225	2,160,230	1,937,930	222,300	3,321,800	2,313,300	1,008,500	180,108 32
236,040	367,750				2,793,140	815,340	1,977,800	4,244 76
291,240	381,560							1,972 44
1,503,125	2,553,065							9,581 25
24,550	8,800							222 30
3,981,275	571,150				419,800	344,300	75,500	26,748 35
71,865,815	60,863,495	2,160,230	1,937,930	222,300	6,534,740	3,472,940	3,061,800	462,197 47

W. J. GERALD,
Deputy Minister.

APPENDIX A—C[illegible]—CIGARS.

DR.

No. 22.—WAREH[illegible] Year ended June 30, 1901.



INTERNAL REVENUE DEPARTMENT,
August 10, 1901.

APPENDIX A—*Continued*—CIGARS.

No. 28.—COMPARATIVE STATEMENT of Warehouse Returns for the Years ended June 30, 1900 and 1901.

Dr. Cr.

Remaining in Warehouse from last year			Entered for Warehouse			Total Number of Packages to be Accounted for			Entered for Consumption.				Returned to Bond for other Warehouses	Exported	Taken for Re-working	Remaining in Warehouse			Total Number accounted for		
Foreign	Canadian	Combination	Foreign	Canadian	Combination	Foreign	Canadian	Combination	Packages	Foreign at $6 p. M	Canadian at $4 p. M	Combination at $3 p. M	Duty	Foreign	Foreign	Canadian	Foreign	Foreign	Canadian	Combination	Foreign	Canadian	Combination
No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.	$ cts.	No.	No.	No.	No.	No.			No.	No.	
5,709,000	90,000		21,000			208,500	31,867,000	92,000	1900	21,000	29,000		144,925 77	284,000	1,975		7,079,025	490,000			31,867,000	2,000	
			25,464,000						Ontario	4,284,000													
7,[illegible]	90,000	180,000	32,214,000	90,450	712,500	196,410	10,203,750	409,500	Quebec	32,340,000	800,550	625,000	196,475 40	442,410	91,125	22,500	17,460	2,553,450		40,950	40,945,785	800,550	180,000
1,[illegible]			708,750		922,500		1,414,500		New Brunswick	945,000		703,500	2,343 70		54,375			413,475		270,000	1,414,500		
1,[illegible]			346,500			2,500	344,000		Nova Scotia	408,500			2,422 20		2,000			108,500			344,000		
1,[illegible]			4,[illegible],000				4,401,250		Manitoba	3,466,250			20,841 28					934,000			4,401,250		
[illegible]			1,[illegible],375			217,500	1,028,250		British Columbia	1,[illegible],875			4,420 85		17,500			274,000			1,028,250		
			1,[illegible],000																				
15,147,[illegible]	180,000	180,000	4,[illegible],000	90,450	1,635,000	636,910	28,087,250	501,500	Totals	51,200	829,550	1,328,500	370,970 40	726,410	167,975	22,500	17,460	10,886,550	490,000	40,950	28,087,250	800,550	180,000
										61,797,985													
									1901														
7,[illegible],[illegible]	90,000		26,[illegible],[illegible]			208,000	33,[illegible],[illegible]	501,000	Ontario	35,[illegible],[illegible]	54,000		190,[illegible],[illegible]	288,000	1,000		543,000	8,[illegible],[illegible]			33,[illegible],[illegible]	90,000	
1,[illegible],[illegible]	90,000	180,000	4,[illegible],[illegible]	90,450	1,[illegible],500	702,[illegible]	38,[illegible],[illegible]	222,500	Quebec	11,[illegible],[illegible]	132,[illegible]	816,[illegible]	194,[illegible],[illegible]	442,[illegible]	86,[illegible]	24,[illegible]	70,000	4,[illegible],[illegible]	452,[illegible]	39,[illegible],[illegible]	39,[illegible],[illegible]	222,500	1,[illegible],[illegible]
113,[illegible]			567,750		1,[illegible],000		2,[illegible],[illegible]		New Brunswick	452,[illegible]		1,[illegible],[illegible]	2,[illegible],[illegible]		2,000		226,500	2,[illegible],[illegible]			2,[illegible],[illegible]		
396,[illegible]			1,[illegible],[illegible]			20,000	510,000		Nova Scotia	276,[illegible]			1,[illegible],[illegible]		20,000			196,[illegible]			510,000		
1,[illegible]			2,[illegible],[illegible]				4,[illegible],[illegible]		Manitoba	2,[illegible],[illegible]			17,[illegible],[illegible]					1,[illegible],[illegible]			4,[illegible],[illegible]		
[illegible]			[illegible],[illegible]				[illegible],[illegible]		N. W. Territories	[illegible],[illegible]			[illegible],[illegible]					[illegible],[illegible]			[illegible],[illegible]		
[illegible]			21,[illegible]			70,[illegible]	945,[illegible]		British Columbia	[illegible],[illegible]			4,[illegible],[illegible]		18,[illegible]			29,[illegible]			945,[illegible]		
[illegible],[illegible]	[illegible]	[illegible]	[illegible],[illegible]	[illegible]	[illegible]	[illegible],[illegible]	[illegible],[illegible]	[illegible],[illegible]	Totals	61,[illegible],[illegible]	186,[illegible]	1,[illegible],[illegible]	397,[illegible],[illegible]	730,[illegible]	143,[illegible]	24,[illegible]	613,[illegible]	14,[illegible],[illegible]	452,[illegible]	39,[illegible],[illegible]	77,[illegible],[illegible]	312,[illegible]	1,[illegible],[illegible]
			[illegible],[illegible]																				

Total duty collected on manufactory and warehouse business

1900	1901
$ 813,812 50	$ 825,230 50
14,000 00	11,000 00
Totals	$ 827,812 50	$ 836,230 50

INLAND REVENUE DEPARTMENT,
OTTAWA, August 19, 1901.

W. J. GERALD,
Deputy Minister

APPENDIX A—*Continued.*—INSPECTION OF PETROLEUM.

No. 24.—RETURN of Canadian Petroleum and Naphtha inspected during the Year ended June 30, 1901.

DIVISIONS.	LICENSES.		Petroleum.	Naphtha.	Totals.
	No.	Fees.			
		$	Galls.	Galls.	Galls.
London	1	1	11,197,314 80	1,477,662 77	12,674,977 57

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX A—*Continued*—INSPECTION OF PETROLEUM.

No. 25.—Comparative Statement of Petroleum and Naptha inspected during the Years ended June 30, 1900 and 1901.

Under Old Act.	Provinces.	Packages. At 25 cts.	At 10 cts.	At 5 cts.	At 2½ cts.	Fees Collected.
		No.	No.	No.	No.	$ cts.
July 1 to Aug., 31 1899	Ontario	1	24,268	15	12,892	2,750 17
	Quebec		13,705			1,370 50
	New Brunswick		4,718	21	13	473 19
	Nova Scotia		2,840		1,654	325 35
	Prince Edward Island		150			15 00
	Manitoba	3	1,993		1,200	230 05
	N. W. Territories		1		50	1 35
	British Columbia		271	300	11,800	337 10
	Totals	4	47,946	336	27,609	5,502 71

Under New Act.	Licenses. No.	Licenses. Fees.	Petroleum.	Naptha.	Totals.
		$	Galls.	Galls.	Galls.
September 1, 1899, to June 30, 1900	2	2	10,323,076 08	1,273,359 21	11,596,435 29
Year 1901	1	1	11,197,314 80	1,477,662 77	12,674,977 57

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 26.—RETURN of Manufactures

DIVISIONS.	LICENSES.		MATERIALS USED.			
	No.	Fees.	Spirits.	Beer, Wine, &c.	Nitric Acid.	Mercury.
		$ cts.	Galls.	Galls.	Lbs.	Lbs.
Brantford, Ont.	2	100 00	14,433·98	902·90	.....	.....
Hamilton "	2	100 00	29,723·72	446·00	.....	.....
Kingston "	1	50 00	7,555·93	209·28	.....	.....
Prescott "	1	300 00	115,937·52	.....	564,918	61,516
Toronto "	4	175 00	50,965·57	664·80	.....	.....
Windsor "	3	400 00	4,160·67	.....	18,160	2,323
Totals	13	1,125 00	222,777·39	2,222·98	583,078	63,839
Montreal, Que.	5	350 00	46,393·17	1,216·70	.....	.....
Quebec "	1	50 00	17,950·53	920·00	.....	.....
St. Hyacinthe, Que.	1	50 00	20,460·59	748·50	.....	.....
Sherbrooke, "	3	500 00	40,481·63	151·10	150,377	19,039
Totals	10	950 00	125,285·92	3,036·30	150,377	19,039
St. John, N.B	2	100 00	4,642 04	69·90	.....	.....
Grand Totals	25	2,175 00	352,705·35	5,329·18	733,455	82,878

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Year ended June 30, 1901.

Manufactured.		Paid Duty Ex-Manufactory.		Warehoused.		Total Duty Collected Ex-Manufactory, including License Fees.
Vinegar.	Crude Fulminate.	Vinegar.	Duty.	Vinegar.	Crude Fulminate.	
Galls.	Lbs.	Galls.	$ cts.	Galls.	Lbs.	$ cts.
76,280·87	.....	73,375·65	2,935 05	2,905·22	.....	3,035 05
181,942·06	.....	75,739·22	3,029 57	106,202·84	.....	3,129 57
52,869·17	.....	22,553·72	902 13	30,315·45	.....	902 13
.....	75,921·00	.....	.....	.....	75,921·00	300 00
345,175·95	.....	191,137·86	7,645 52	154,038·09	.....	7,820 52
.....	2,733·15	.....	.....	.....	2,733·15	400 00
656,268·05	78,654·15	362,806·45	14,512 27	293,461·60	78,654·15	15,637 27
260,218·43	.....	221,693·55	8,867 78	38,524·88	.....	9,217 78
101,208·48	.....	79,142·69	3,165 72	22,065·79	.....	3,215 72
121,177·11	.....	75,936·14	3,211 98	45,240·97	.....	3,261 98
32,424·43	22,496·00	22,033·02	881 32	10,391·41	22,496·00	1,381 32
515,028·45	22,496·00	398,805·40	16,126 80	116,223·05	22,496·00	17,076 80
28,436·13	.....	22,115·58	884 63	6,320·55	.....	984 63
1,199,732·63	101,150·15	783,727·43	31,523 70	416,005·20	101,150·15	33,698 70

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 27.—Comparative Statement of Manufactures

Provinces.	Licenses.		Materials Used.			
	No.	Fees.	Spirits.	Beer. Wine, &c.	Nitric Acid.	Mercury.
1900.		$	Galls.	Galls.	Lbs.	Lbs.
Ontario	15	1,225	213,654·19	2,122·84	575,269	63,002½
Quebec	11	725	69,218·27	1,671·80	74,635	9,163
New Brunswick	1	50	3,892·50	174·40	...	...
Totals	27	2,000	286,764·96	3,969·04	649,904	72,165½
1901.						
Ontario	13	1.125	222.777·39	2,222·98	583,078	63,839
Quebec	10	950	125,285·92	3,036·30	150,377	19,039
New Brunswick	2	100	4,642·04	69·90	...	...
Totals	25	2,175	352,705·35	5,329·18	733,455	82,878

Inland Revenue Department,
Ottawa, August 10, 1901.

for the Years ended June 30, 1900 and 1901.

Manufactured.		Paid Duty ex-Manufactory.		Warehoused.		Total Duty Collected ex-Manufactory, including License Fees.
Vinegar.	Crude Fulminate.	Vinegar.	Duty.	Vinegar.	Crude Fulminate.	
Galls.	Lbs.	Galls.	$ cts.	Galls.	Lbs.	$ cts.
529,533·24	78,120¾	330,138·69	13,205 51	199,394·55	78,120¾	14,430 51
282,344·46	10,782	238,746·00	9,773 59	43,598·46	10,782	10,498 59
25,167·30	.....	18,977·76	759 13	6,189 54	.....	809 13
837,045·00	88,902¾	587,862·45	23,738 23	249,182·55	88,902¾	25,738 23
656,268·05	78,654·15	362,806·45	14,512 27	293,461·60	78,654·15	15,637 27
515,028·45	22,496·00	398,805·40	16,126 80	116,223·05	22,496·00	17,076 80
28,436·13	.....	22,115·58	884 63	6,320·55	.....	984 63
1,199,732·63	101,150·15	783,727·43	31,523 70	416,005·20	101,150·15	33,698 70

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

DR. No. 28.—WAREHOUSE RETURN for

Remaining in Warehouse from Last Year.	Placed in Warehouse.		Received from other Divisions.	Totals.		DIVISIONS.
Vinegar.	Vinegar.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.	
Galls.	Galls.	Lbs.	Galls.	Galls.	Lbs.	
1,106·70	2,905·22	.....	.....	4,011·92	.....	..Brantford, Ont .....
14,975·21	106,202·84	.....	.....	121,178·05	.....	..Hamilton " .....
.....	30,315·45	.....	.....	30,315·45	.....	..Kingston " .....
.....	.....	75,921·00	.....	.....	75,921·00	..Prescott " .....
98,999·50	154,938·09	.....	.....	253,037·59	.....	..Toronto " .....
.....	.....	2,733·15	.....	.....	2,733·15	..Windsor " .....
115,081·41	293,461·60	78,654·15	.....	408,543·01	78,654·15	.....Totals .....
.....	38,524·88	.....	4,074·42	42,599·30	.....	..Montreal, Que.....
19,867·20	22,065·79	.....	.....	41,932·99	.....	..Quebec " .....
.....	45,240·97	.....	15,937·33	61,178·30	.....	..St. Hyacinthe " .....
12,742·82	10,391·41	22,496·00	.....	23,134·23	22,496·00	..Sherbrooke " .....
32,610·02	116,223·05	22,496·00	20,011·75	168,844·82	22,496·00	..... Totals.....
6,189·54	6,320·55	.....	.....	12,510·09	.....	..St. John, N.B.... ...
153,880·97	416,005·20	101,150·15	20,011·75	589,897·92	101,150·15	.....Grand totals.....

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

the Year ended June 30, 1901. CR.

Entered for Consumption.		Removed to other Divisions.	Exported.		Remaining in Warehouse.	Totals.	
Vinegar.	Duty.	Vinegar.	Vinegar.	Duty.	Vinegar.	Vinegar.	Crude Fulminate.
Galls.	$ cts.	Galls.	Galls.	$ cts.	Galls.	Galls.	Lbs.
2,907·00	116 28	.....	....	....	1,104·92	4,011 92	.....
73,757·11	2,950 28	.....	....	....	47,420·94	121,178·05	....
13,332·25	533 29	....	.....	.....	16,983·20	30,315·45	.....
.....	....	.....	.....	75,921·00	.....	....	75,921·00
105,935·25	4,237 46	4,074·42	728·18	.....	142,299·74	253,037·59	.....
.....	.....	.....	.....	2,733·15	.....	....	2,733·15
195,931·61	7,837 31	4,074·42	728·18	78,654·15	207,808·80	408,543·01	78,654·15
15,290·92	611 64	.....	.....	.. ..	27,308·38	42,599·30	.....
19,867·20	794 68	.....	....	.....	22,065·79	41,932·99	....
19,109·49	764 38	... .	....	....	42,068·81	61,178·30	.....
7,196·90	287 87	15,937·33	....	22,496·00	.....	23,134·23	22,496·00
61,464·51	2,458 57	15,937·33	. . ....	22,496·00	91,442·98	168,844·82	22,496·00
6,189·54	247 58	.....	.....	....	6,320·55	12,510·09	....
263,585·66	10,543 46	20,011·75	728·18	101,150·15	305,572·33	589,897·92	101,150·15

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

DR. No. 29.—COMPARATIVE STATEMENT of Warehouse Returns

Remaining in Warehouse from Last Year.	Placed in Warehouse.		Received from other Divisions.	Totals.		PROVINCES.
Vinegar.	Vinegar.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.	
Galls.	Galls.	Lbs.	Galls.	Galls.	Lbs.	1900.
4,871·72	199,394·55	78,120¾	9,646·71	213,912·98	78,120¾	Ontario
15,628·50	43,598·46	10,782	16,194·18	75,421·14	10,782	Quebec
.....	6,189·54	.....	.....	6,189·54	.....	New Brunswick
20,500·22	249,182·55	88,902¾	25,840·89	295,523·66	88,902¾	Totals
						1901.
115,081·41	293,461·60	78,654·15	.....	468,543·01	78,654·15	Ontario
32,610·02	116,223·05	22,496	20,011·75	168,844·82	22,496	Quebec
6,189·54	6,320·55	.....	.....	12,510·09	.....	New Brunswick
153,880·97	416,005·20	101,150·15	20,011·75	589,897·92	101,150·15	Totals

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

for the Years ended June 30, 1900 and 1901. CR.

Entered for Consumption.		Removed to other Divisions.	Exported.		Remaining in Warehouse	Totals.	
Vinegar.	Duty.	Vinegar.	Vinegar.	Crude Fulminate.	Vinegar.	Vinegar.	Crude Fulminate.
Galls.	$ cts.	Galls.	Galls.	Lbs.	Galls.	Galls.	Lbs.
69,984·88	2,799·40	24,395·50	4,451·19	78,120¾	115,081·41	213,912·98	78,120¾
41,365·73	1,654·62	1,445·39	.....	10,782	32,610·02	75,421·14	10,782
.....	.....	.....	.....	.....	6,189·54	6,189·54	.....
111,350·61	4,454·02	25,840·89	4,451·19	88,902¾	153,880·97	295,523·66	88,902¾
195,931·61	7,837·31	4,074·42	728·18	78,654·15	207,808·80	408,543·01	78,654·15
61,464·51	2,458·57	15,937·33	.....	22,496	91,442·98	168,844·82	22,496
6,189·54	247·58	.....	.....	.....	6,320·55	12,510·09	.....
263,585·66	10,543·46	20,011·75	728·18	101,150·15	305,572·33	589,897·92	101,150·15

	1900.	1901.
Total duty collected, ex-manufactory and ex-warehouse	$ 28,192 25	$ 42,067 16
" on licenses	2,000 00	2,175 00
Totals	$ 30,192 25	$ 44,242 16

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—MANUFACTURES IN BOND.

No. 30.—STATEMENT showing the transactions in Vinegar in the Bonded Manufactories in the Dominion of Canada, during the Year ended June 30, 1901.

On hand July 1, 1900.	Manufactured during the Year.	Brought in.	Totals.	DIVISIONS.	Removed.	On hand June 30, 1901.	Totals.
Galls.	Galls.	Galls.	Galls.		Galls.	Galls.	Galls.
1,106 70	76,280 87	....	77,387 57	....Brantford, Ont	76,282 65	1,104 92	77,387 57
21,923 78	181,942 06	43,947 57	247,813 41	....Hamilton "	192,386 40	55,427 01	247,813 41
... .	52,869 17	.....	52,869 17	...Kingston "	35,885 97	16,983 20	52,869 17
98,999 50	345,175 95	.....	444,175 45	....Toronto "	301,875 71	142,299 74	444,175 45
122,029 98	656,268 05	43,947 57	822,245 60	.....Totals.	606,430 73	215,814 87	822,245 60
6,788 32	260,218 43	10,395 04	277,401 79	....Montreal, Que.....	241,113 74	36,288 05	277,401 79
19,867 20	101,208 48	.....	121,075 68	...Quebec "	99,009 89	22,065 79	121,075 68
365 29	121,177 11	246 80	121,789 20	....St. Hyacinthe, Que.....	77,469 08	44,320 12	121,789 20
15,680 22	32,424 43	....	48,104 65	....Sherbrooke "	48,104 65	.....	48,104 65
42,701 03	515,028 45	10,641 84	568,371 32	.....Totals.....	465,697 36	102,673 96	568,371 32
6,189 54	28,436 13	.....	34,625 67	....St. John, N.B.....	28,305 12	6,320 55	34,625 67
170,920 55	1,199,732 63	54,589 41	1,425,242 59	..... .Grand Totals	1,100,433 21	324,809 38	1,425,242 59

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

APPENDIX A—*Continued*—ACETIC ACID.

No. 31.—RETURN of Manufactures for the Year ended June 30, 1901.

DIVISIONS.	LICENSES.		MANUFACTURED.	PAID DUTY EX-MANUFACTORY.		FREE, DUTY PAID ACID TAKEN FOR RE-WORKING.	WAREHOUSED.	Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.	Acetic Acid.	Acetic Acid.	Duty.	Acetic Acid.	Acetic Acid.	
			Galls.	Galls.	$ cts.	Galls.	Galls.	$ cts.
Toronto, Ont..	1	50	223,555·84	152,969·74	6,118 79	4,827·77	65,758·33	6,168 79
Montreal, Que.	1	50	7,754·67	1,043·46	41 74	.....	6,711·21	91 74
Totals.....	2	100	231,310·51	154,013·20	6,160 53	4,827·77	72,469·54	6,260 53

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

No. 32.—COMPARATIVE STATEMENT of Manufactures for the Years ended June 30, 1900 and 1901.

PROVINCES.	LICENSES.		MANUFACTURED.	PAID DUTY EX-MANUFACTORY.		FREE, DUTY PAID ACID TAKEN FOR RE-WORKING.	WAREHOUSED.	Total Duty collected ex-Manufactory, including License Fees.
	No.	Fees.	Acetic Acid.	Acetic Acid.	Duty.	Acetic Acid.	Acetic Acid.	
1900.			Galls.	Galls.	$ cts.	Galls.	Galls.	$ cts.
Ontario	1	50	189,511·36	163,166·28	6,526 65	.....	26,345·08	6,576 65
Quebec	1	50	45,316·14	44,772·14	1,799 90	.....	544·00	1,840 90
Totals.....	2	100	234,827·50	207,938·42	8,317 55	.....	26,889 08	8,417 55
1901.								
Ontario	1	50	223,555·84	152,969·74	6,118 79	4,827·77	65,758·33	6,168 79
Quebec	1	50	7,754·67	1,043·46	41 74	.....	6,711·21	91 74
Totals.....	2	100	231,310·51	154,013·20	6,160 53	4,827·77	72,469·54	6,260 53

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX A—*Continued*—ACETIC ACID.

DR. No. 33.—WAREHOUSE RETURN for the Year ended June 30, 1901. CR.

Remaining in Warehouse from last year.	Placed in Warehouse.	Totals.	DIVISIONS.	Entered for Consumption.	Duty.	Remaining in Warehouse.	Totals.
Galls.	Galls.	Galls.		Galls.	$ cts.	Galls.	Galls.
26,345 08	65,758 33	92,103 41	....Toronto	61,304 25	2,452 18	30,799 16	92,103 41
.....	6,711 21	6,711 21	....Montreal	4,922 81	196 91	1,788 40	6,711 21
26,345 08	72,469 54	98,814 62	.....Totals.	66,227 06	2,649 09	32,587 56	98,814 62

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

APPENDIX A—*Continued*—ACETIC ACID.

No. 34.—Comparative Statement of Warehouse Returns for the Years ended June 30, 1900 and 1901.

Dr. Cr.

Remaining in Warehouse from last year.	Placed in Warehouse.	Totals.	Provinces.	Entered for Consumption.	Duty.	Remaining in Warehouse.	Totals.
Galls.	Galls.	Galls.	1900.	Galls.	$ cts.	Galls.	Galls.
26,800 33	26,345 08	53,145 41	... Ontario.....	26,800 33	1,072 02	26,345 08	53,145 41
3,390 65	544 00	3,934 65	....Quebec	3,934 65	157 39	....	3,934 65
30,190 98	26,889 08	57,080 06	Totals	30,734 98	1,229 41	26,345 08	57,080 06
			1901.				
26,345 08	65,758 33	92,103 41	....Ontario.....	61,304 25	2,452 18	30,799 16	92,103 41
.....	6,711 21	6,711 21	....Quebec	4,922 81	196 91	1,788 40	6,711 21
26,345 08	72,469 54	98,814 62	Totals	66,227 06	2,649 09	32,587 56	98,814 62

	1900.	1901.
Total duty collected, ex-manufactory and ex-warehouse.....	$ 9,546 96	$ 8,809 62
" on licenses.....	100 00	100 00
	$ 9,646 96	$ 8,909 62

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

APPENDIX A—*Continued*—METHYLATED SPIRITS.

No. 35.—STATEMENT showing quantity of Raw Materials on hand at beginning and end of year and brought in and used during the Year 1900–1901.

DR. CR.

(A)

Names of Articles.	Stock on hand July, 1900.	Brought in during the year.	Total to be Accounted for.	Used in manufacture of Methylated Spirits.	Sold.	Stock on hand June 30, 1901.	Total Accounted for.
	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.
Alcohol.....	4,387·52	73,630·29	78,017·81	69,138·13	.....	8,879·68	78,017·81
Wood Naphtha	5,117·82	28,229·24	33,347·06	26,898 96	91·93	6,356·17	33,347·06

(B)

STATEMENT showing quantity of Raw Material used and Methylated Spirits produced therefrom.

Alcohol used. Statement (A) above.	Wood Naphtha used. Statement (A) above.	Methylated Spirits used. Statement (C) below.	Total to be Accounted for.	Methylated Spirits produced.	Loss in Manufacture.		Total Accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	p. c.	Pr'f galls.
69,138·13	26,898·96	....	96,037·09	94,653·06	1,384·03	1·46	96,037·09

(C)

STATEMENT showing quantity of Methylated Spirits on hand at beginning and end of year, and brought in, sold and otherwise accounted for during the Year.

Stock on hand July 1, 1900.	Manufactured as above. Statement (B)	Brought in during the year.	Total to be Accounted for.	Sold.	Used in Methylated Spirits Warehouse.	Re-used in Manufacture of Methylated Spirits.	Stock on hand June 30, 1901.	Total Accounted for.
Pr'f galls.	Pr'f galls.	Pr'f galls,	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Pr'f galls.	Prf galls.
2,911·68	94,653·06	.....	97,564·74	94,449·75	.....	.....	3,114·99	97,564·74

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX A—*Continued.*

No. 36.—STATEMENT of Lumber measured, culled and counted, through the Office of the Supervisor of Cullers, at the Port of Quebec, during the Fiscal Year ended June 30, 1901.

Pieces.	Description.	Measured culled and counted.	Tons standard.	Rate.	Cullers' fees.	Total accrued.
				cts.	$ cts.	$ cts.
22,661	Waney White Pine	Stringed	34,384 01			
1	" Red Pine	"	1 07			
1	" Oak	"	1 20			
1,747	" Elm	"	955 35			
5,589	" Ash	"	3,177 03			
20,637	" Birch	"	10,994 10			
564	" Maple	"	543 37			
340	" Hickory	"	116 23			
14	" Basswood	"	16 07			
28	" Cherry	"	14 15			
17	" Butternut	"	12 32			
1,146	" Walnut	"	532 13			
1	" Balm of Gilead	"	1 38			
3	" Whitewood	"	2 13			
245	" Chestnut	"	216 17			
			50,970 29	9⅜	4,778 51	
13,286	Square White Pine	Measured	13,428 11	6¼	839 27	
1,535	" Red Pine	"	1,526 35			
6,552	" Oak	"	10,704 59			
15,784	" Elm	"	18,503 08			
373	" Hickory	"	309 26			
2,716	" Birch	"	1,110 07			
1	" Maple	"	0 29			
1	" Tamarac	"	0 22			
			32,156 06	8¼	2,652 88	
						8,270 66
				Add for	fractions	0 12
						8,270 78

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

DR. **No. 37.—HYDRAULIC and other Rents, &c.,**

Balances due on July 1, 1900.	Rents and Interest accrued up to June 30, 1901.	Totals.	Numbers.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
100 00	200 00	300 00	1	Ottawa River...	Perley & Pattee.....	J. R. Booth .....
50 00	100 00	150 00	2	"	Thompson & Perkins....	" .....
150 00	300 00	450 00	3	"	Lyman Perkins.....	" .....
.....	300 00	300 00	4	"	R. Blackburn *et al*	McKay Milling Co., Ltd
.....	100 00	100 00	5	"	J. & J. Petrie.....	Ottawa Electric Co...
50 00	100 00	150 00	6	"	A. H. Baldwin	" ....
.....	300 00	300 00	7	"	Ottawa Electric Ry. Co..	.....
200 00	400 00	600 00	8	"	Perley & Pattee.....	Ottawa Electric Co....
.....	100 00	100 00	9	"	J. M. Currier.....	N. S. Blaisdell .....
.....	600 00	600 00	10	"	Harris, Bronson & Co...	The Bronson & Weston Lumber Co.....
.....	200 00	200 00	11	"	Levi Young	Ottawa Electric Ry. Co
.....	104 00	104 00	12	"	J. R. Booth	.....
.....	10 00	10 00	13	"	Bronson & Weston	.....
.....	100 00	100 00	14	"	"	.....
.....	96 00	96 00	15	"	Perley & Pattee.....	J. R. Booth.....
40 00	8 00	48 00	16	"	L. M. Coutlee	Mary Conroy.....
570 84	.....	570 84	17	"	John Rochester.....	.....
.....	25 00	25 00	18	"	Nérée Têtreau.....	Thomas Ahearn.....
200 00	.....	200 00	19	"	Hon. J. Skead.....	.....
96 00	.....	96 00	20	"	"	.....
.....	1 00	1 00	21	"	G. A. Grier & Co	Ottawa Investment Co.
380 00	.....	380 00	22	"	John Rankin	.....
75 00	150 00	225 00	23	"	J. R. Booth	.....
45 00	5 00	50 00	24	"	Colin Dewar.....	.....
.....	50 00	50 00	25	"	Bronson & Weston.....	.....
2 00	1 00	3 00	26	"	Alfred Desjardins.....	.....
10 00	10 00	20 00	27	"	Ottawa Electric Co	.....
.....	1 00	1 00	1	St. Lawrence R.	Que. Har. Commissioners	.....
50 00	25 00	75 00	2	" ..	Rich. and Ont. Nav. Co.	.....
.....	1 00	1 00	3	Kingston, Ont..	The Frontenac Milling Co., Ltd	.....
.....	1 00	1 00	4	Quebec.....	Corporation of Quebec ..	.....
.....	1 00	1 00	5	"	Narcisse Blais.....	.....
.....	5 00	5 00	6	Richibucto Har.	Wm. Hudson	.....
.....	1 00	1 00	7	Rondeau Har...	School Trustees.....	.....
.....	1 00	1 00	8	Collingwood H .	Great North'n Transit Co.	.....
1 00	1 00	2 00	9	Ottawa.....	E. G. Laverdure.....	.....
.....	1 00	1 00	10	Walkerton, Ont.	D. Robertson & J. Rowland	.....
1 00	1 00	2 00	11	Three Rivers....	Corporation of Three Riv.	.....
.....	100 00	100 00	12	" ...	W. Ritchie.....	.....
165 00	.....	165 00	13	British Columbia	A. Peel	.....
90 00	.....	90 00	14	" ..	Jonathan Maury.....	.....
25 00	25 00	50 00	15	" ..	Roderick Finlayson.....	.....
25 00	25 00	50 00	16	" ..	Joseph Spratt..	.....
.....	1 00	1 00	17	" ..	Bank of British Columbia	.....
.....	1 00	1 00	18	" ..	W. Dodd.....	.....
.....	12 00	12 00	19	" ..	D. W. Gordon.	.....
.....	5 00	5 00	20	" ..	S. Williams.....	.....
.....	5 00	5 00	21	" ..	Geo. H. Huff.	.....
.....	1 00	1 00	22	" ..	Canadian Pac. Ry. Co...	.....
.....	50 00	50 00	23	" ..	John Reid..	.....

Lessees' Accounts, 1900–1901. Cr.

Description of Property.	Numbers.	Date to which Account is made up.	Paid during fiscal Year.	Balances due on June 30, 1901.	Totals.
			$ cts.	$ cts.	$ cts.
Lots B and C, Chaudière St., service ground	1	June 30, 1901	200 00	100 00	300 00
Lot D	2	" 30, 1901	100 00	50 00	150 00
Lots E, F and G, South Head St.	3	" 30, 1901	300 00	150 00	450 00
Lots H, I and J, grist mill, South Head St.	4	" 30, 1901	150 00	150 00	300 00
Lot K, fanning mill, South Head St.	5	Dec. 31, 1900	100 00		100 00
Lot L, service ground	6	" 31, 1900	150 00		150 00
Lots Q, R and T, service ground, North Middle St	7	" 31, 1900	300 00		300 00
Lots M, N O and P, service ground (no water used)	8	" 31, 1900	600 00		600 00
Lot S, service ground	9	June 30, 1901	100 00		100 00
Lots U, V, W, X and Y, service ground	10	" 30, 1901	600 00		600 00
Two strips of land	11	Jan. 1, 1902	200 00		200 00
Lumber yard at head of slides	12	Sept. 20, 1901	104 00		104 00
Bridge over slides	13	June 30, 1902	10 00		10 00
Strip of land, Amelia Island	14	Jan. 1, 1902	100 00		100 00
Reserve, head of Chaudière Island	15	" 1, 1902	96 00		96 00
Small Island, Deschênes Rapids	16	" 1, 1901		48 00	48 00
Portion of lot 39, Concession 'A,' Nepean	17	Feb. 1, 1885		570 84	570 84
Excavated channel slide and two dams, Little Chaudière	18	Mar. 1, 1902	25 00		25 00
Water lots opposite lot 30, Concession 'A,' Nepean	19	Dec. 1, 1891		200 00	200 00
Three small islands, Ottawa River	20	May 1, 1891		96 00	96 00
Covering over portion of Ottawa slides	21	Nov. 10, 1901	1 00		1 00
East portion of Hawley's Island	22	June 30, 1891		380 00	380 00
Piece of land, south-west end of Union Bridge	23	Nov. 12, 1901	150 00	75 00	225 00
Piece of land on Victoria Island	24	June 15, 1902		50 00	50 00
Piece of land, south side of Middle St., Victoria Island	25	Aug. 31, 1901	50 00		50 00
Piece of land, Longue Pointe Rouge, Templeton, Ottawa County	26	Oct. 24, 1901	3 00		3 00
Lot Pa, South Head St.	27	Jan. 10, 1902	20 00		20 00
Small lot near Custom House, Quebec	1	Sept. 1, 1901	1 00		1 00
Roadway from pier at Côteau Landing	2	July 1, 1901		75 00	75 00
Portion of the Graving Dock, Gore St., Ont.	3	May 31, 1902	1 00		1 00
Old Provincial Government Building grounds on Mountain Hill	4	June 25, 1902	1 00		1 00
Privilege to erect bridge on St. Charles River	5	Feb. 6, 1902	1 00		1 00
Piece of land at North Beach	6	June 30, 1900	5 00		5 00
Use of old log house formerly used as Custom House, Shrewsbury, Ont.	7	Sept. 11, 1900	1 00		1 00
Use of old breakwater for storing coal	8	Feb. 5, 1902		1 00	1 00
South-east half of lot 8, Ottawa	9	Dec. 18, 1901		2 00	2 00
Right of way over strip of land	10	April 27, 1902	1 00		1 00
Lot of land on St. Christopher Island, St. Maurice River	11	Dec. 1, 1901	2 00		2 00
Outlet of River St. Maurice	12	June 30, 1901		100 00	100 00
Portion of Assay Office, New Westminster	13	June 11, 1881		165 00	165 00
" "	14	" 11, 1881		90 00	90 00
Privilege to erect two bulk heads, Rock Bay, Victoria Harbour	15	" 1, 1902	25 00	25 00	50 00
Privilege to build a wharf opposite his own property, Victoria Harbour	16	" 1, 1902	25 00	25 00	50 00
Right of drainage through Government property, Nanaimo	17	Dec. 1, 1901	1 00		1 00
Old Government House, Yale	18	July 24, 1900	1 00		1 00
Beach lots A, C, E and F, front of 7, 8 and 9, Nanaimo Harbour	19	Aug. 27, 1901	12 00		12 60
Frontage on lot 7, block M, Victoria	20	July 16, 1901	5 00		5 00
Permission to build a wharf on lot A, block 2, Somas River, Alberni, B.C.	21	Aug. 12, 1901	5 00		5 00
Portion of Custom House lot, New Westminster	22	April 14, 1902	1 00		1 00
Lot 1, block 13, corner Begbie and Columbia Sts., New Westminster	23	May 12, 1902	50 00		50 00

DR. No. 37.—HYDRAULIC and other Rents, &c.,

Balances due on July 1, 1900.	Rents and Interest accrued up to June 30, 1901.	Totals.	Numbers.	Location.	Original Lessees.	Present Occupants.
$ cts.	$ cts.	$ cts.				
70 00	.....	70 00	24	Rivière du Lièvre	Dominion Phosphate Co. Ltd	.....
.....	1 00	1 00	25	Charlottetown...	Rt. Rev. Bishop McIntyre	Rt. Rev. Bishop McDonald.....
20 00	20 00	40 00	26	Rivière St. Maurice	Laurentides Pulp Co. Ltd.	.....
.....	16 00	16 00	27	Antigonish, N.S.	L. C. Archibald.....	.....
.....	1 00	1 00	28	Owen Sound...	Grand Trunk Railway...	.....
240 00	....	240 00	29	Windsor	Archie McNee	.....
.....	1 00	1 00	30	Levis, Quebec...	Cyrille Robitaille	.....
.....	1 00	1 00	31	Port Morien, N.S	The Gourie & Blackhouse Collieries, Ltd.....	....
5 00	5 00	10 00	32	Bayfield, N.S...	Chas. S. Gass.	....
.....	1 00	1 00	33	" ..	"	....
2,660 84	3,570 00	6,230 84				

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

Lessees' Accounts, 1900–1901—*Concluded.*

CR.

Description of Property.	Numbers.	Date to which Account is made up.	Paid during Fiscal Year.	Balances due on June 30, 1901.	Totals.
			$ cts.	$ cts.	$ cts.
Permission to erect a landing at Little Rapids, Rivière du Lièvre	24	April 30, 1898	.....	70 00	70 00
Leave to connect drain to main service of public building	25	May 16, 1902	.....	1 00	1 00
Tract of land, Chûte de la Grand-Mère, St. Maurice River	26	June 17, 1902	20 00	20 00	40 00
Track of land and water lot, McNair's Cove	27	Dec. 30, 1901	16 00	.....	16 00
Lot of land west of Sydenham River	28	" 31, 1901	1 00	.....	1 00
Lot on Ouellette St., Windsor, Ont	29	April 30, 1900	.....	240 00	240 00
Ground rent	30	" 4, 1902	1 00	.....	1 00
Water lot for the purpose of constructing a pier	31	Dec. 20, 1901	1 00	.....	1 00
Water lot	32	" 7, 1901	5 00	5 00	10 00
"	33	June 8, 1902	.....	1 00	1 00
Grand total			3,541 00	2,689 84	6,330 84

W. J. GERALD,
Deputy Minister.

No. 37 (A).—Hydraulic and other Rents, &c.—

Balances due on July 1, 1900.	Totals.	Number.	Location.	Name of Proprietors.
$ cts.	$ cts.			Land Sales—Principal Account.
12,092 83	12.092 83	1	Hamilton and Port Dover Road..	Choat and Kern
433 34	433 34	2	Bonner's property, Quebec.	Timothy Sullivan, now M. Murphy..
333 34	333 34	3		John Bailey, now Alex. Powell
300 00	300 00	4		Abraham Thompson
147 80	147 80	5		John Boomer
248 40	248·40	6		John Garbatz, now J. C. Nolan
154 80	154 80	7		N. H. Bowen
600 00	600 00	8		Estate Robert Reid
333 33	333 33	9		John Chevalier
533 33	533 33	10		Daniel Holden
333 33	333 33	11		George Creeley
63 00	63 00	12		Thomas McAdam
15,573 50	15,573 50			Land Sales—Interest Account.
6,298 25	6,298 25	1	Hamilton and Port Dover Road..	Choat & Kern (matured)
558 00	558 00	2	Bonner's property, Quebec.	Timothy Sullivan, now M. Murphy..
120 00	120 00	3		John Bailey, now Alex. Powell
306 00	306 00	4		Abraham Thompson
155 22	155 22	5		John Boomer
275 82	275 82	6		John Garbatz, now J. C. Nolan
208 95	208 95	7		N. H. Bowen
828 00	828 00	8		Estate Robert Reid
190 00	190 00	9		John Chevalier
298 68	298 68	10		Daniel Holden
35 91	35 91	11		George Creeley
100 00	100 00	12		Thomas McAdam
100 00	100 00	13		Joseph Brook, tenant
9,474 83	9,474 83			

Inland Revenue Department,
Ottawa, August 10, 1901.

SESSIONAL PAPER No. 12

A—*Concluded.*

Lessees' Accounts, 1900–1901—*Concluded.*

Description of Property.	Number.	Date to which the account is made up.	Balances due on June 30, 1901.	Totals.
			$ cts.	$ cts.
Hamilton and Port Dover & Caledonia Bridge	1		12,092 83	12,092 83
Lot No. 1, Wolfe Street	2		433 34	433 34
" 9 "	3		333 34	333 34
" 49 "	4		300 00	300 00
" 73 and 74, Tower Street	5		147 80	147 80
" 64, Wolfe Street and 211 and 252 Ware Street	6		248 40	248 40
" 67 and 68, Monument Street	7		154 80	154 80
" 22 and 23, Wolfe Street	8		600 00	600 00
" 32, Wolfe Street	9		333 33	333 33
" 65 and 66, Wolfe Street	10		533 33	533 33
" 31, Wolfe Street	11		333 33	333 33
" 135, Church Street	12		63 00	63 00
			15,573 50	15,573 50
	1	June 30, 1874	6,298 25	6,298 25
Lot No. 1, Wolfe Street	2	May 1, 1889	558 00	558 00
" 9 "	3	"	120 00	120 00
" 49 "	4	"	306 00	306 00
" 73 and 74, Tower Street	5	"	155 22	155 22
" 64, Wolfe Street, and 211 and 252 Ware Street	6	"	275 82	275 82
" 67 and 68, Monument Street	7	"	208 95	208 95
" 22 and 23, Wolfe Street	8	"	828 00	828 00
" 32, Wolfe Street	9	Nov. 1, 1863	190 00	190 00
" 65 and 66, Wolfe Street	10	"	298 68	298 68
" 31, Wolfe Street	11	"	35 91	35 91
" 135, Church Street	12	"	100 00	100 00
Monument Hotel	13	"	100 00	100 00
			9,474 83	9,474 83

W. J. GERALD,
Deputy Minister.

APPENDIX B.

No. 1.—Details of Excise Expenditures for the Year ended June 30, 1901.

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
McAllister, A.	Salary as Collector for year	.....	37 80	7 20	1,845 00	
Standish, J. G.	" Special Class Exciseman for year	.....	28 04	4 32	1,367 64	
Pole, C. W.	" Deputy Collector for year	.....	25 96	3 60	1,270 44	
McCoy, W.	" 1st Class Exciseman "	.....	20 23	3 00	992 28	
McCuaig, A. F.	" Deputy Collector "	.....	16 04	2 88	781 08	
McFee, A. C.	" 3rd Class Exciseman "	.....	24 60	2 88	677 52	
Brown, W. J.	" Probationary Exciseman from March 25, 1901, to June 30, 1901	6 71	.....	0 72	126 95	
	Salaries	6 71	152 67	24 60	7,060 91	
	Contingencies	.....	.....	.....	699 36	
						7,760 27
	Brantford.					
Spence, John.	Salary as Collector from July 1 to Aug. 31, 1900	.....	5 32	1 20	260 14	
Sinon, E. H.	" Deputy Collector from July 1 to Aug. 31, 1900, and Collector from Sept. 1, 1900, to June 30, 1901	.....	27 30	6 60	1,332 70	
Walsh, D. J.	" Special Class Exciseman for year	.....	24 00	4 32	1,171 68	
Weyms, C.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Bell, J. E.	" 1st " "	.....	19 96	2 88	977 16	
Hart, P. D.	" 2nd " "	.....	16 96	2 88	830 16	
Orr, H. N.	" 1st " "	.....	30 53	2 88	837 84	
Berry, H. L.	" 3rd " "	30 72	.....	2 88	581 40	
Sloan, Wm.	" Deputy Collector from Sept. 1, 1900, to June 30, 1901	45 80	.....	3 00	867 80	
	Salaries	76 52	144 03	29 52	7,836 04	
	Contingencies	.....	.....	.....	910 72	
						8,746 76
	Cornwall.					
Mulhern, M. M.	Salary as Collector for year	.....	20 00	3 60	976 40	
	Contingencies	.....	.....	.....	97 85	
						1,074 25
	Guelph.					
Powell, J. B.	Salary as Collector for year	.....	37 80	7 20	1,845 00	
Till, T. M.	" Deputy Collector for year	.....	27 24	3 60	1,334 15	
Dawson, W.	" Special Class Exciseman for year	.....	28 04	4 32	1,367 64	
Woodward, G. W.	" " "	.....	24 00	4 32	1,171 68	
Broadfoot, S.	" Accountant for year	.....	19 96	4 32	975 72	
Bish, P.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Spence, F. H.	" 1st " "	.....	19 96	2 88	977 16	
Bowman, A.	" 1st " "	.....	19 96	2 88	977 16	
O'Donoghue, M. J.	" 1st " "	.....	20 03	2 88	975 84	
Kilroy, E. T.	" 1st " "	.....	20 03	2 88	975 84	
Brain, A. F.	" 1st " "	.....	31 26	2 88	858 36	
O'Brien, E. C.	" 2nd " "	.....	16 96	2 88	830 16	
Howie, A.	" 3rd " "	.....	15 00	2 88	732 12	

SESSIONAL PAPER No. 12

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts Paid.	Total amounts paid.
	Guelph—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Alteman, P. J.	Salary as 3rd Class Exciseman for year	.....	23 52	2 88	648 60	
Coutts, J. J.	" 3rd " from Mar. 25 to June 30, 1901.	6 71	....	0 72	126 95	
	Salaries	6 71	323 72	50 40	14,773 54	
	Contingencies.....	.....	....	.....	1,214 66	
						15,988 20
	Hamilton.					
Miller, W. F.	Salary as Collector for year.....	.....	43 96	14 40	2,141 64	
Cameron, D. M.	" Special Class Exciseman for year	... .	30 00	4 32	1,465 68	
Ross, S. F.	" Deputy Collector for year.	... ..	30 00	7 20	1,462 80	
Donaghy, W.	" Special Class Exciseman for year	.....	28 04	4 32	1,367 64	
Baby, W. A. D.	" " " ..	.... .	28 04	4 32	1,367 64	
Crawford, W. P.	" Accountant for year	.....	23 48	4 32	1,147 20	
O'Brien, J. F.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Irwin, R.	" 1st " " ..	.....	19 96	2 88	977 16	
Dumbrille, R. W.	" 1st " " ..	.....	19 96	2 88	977 16	
Weir, J.	" 1st " " ..	.....	19 96	2 88	977 16	
Hobbs, G. N.	" 1st " " ..	... ..	18 68	2 88	913 44	
Wardell, R. S. R.	" 1st " " ..	.... .	32 72	2 88	899 40	
Logan, J.	" 2nd " " ..	.....	16 96	2 88	830 16	
Amor, W.	" 2nd " " ..	.....	16 96	2 88	830 16	
Hayhurst, T. H.	" 2nd " " ..	40 29	.....	2 88	763 08	
McKay, G. W.	" 3rd " from July 1, 1900, to April 30, 1901.....	.....	12 50	2 40	610 10	
Bishop, J. B.	" 3rd Class Exciseman for year	31 44	.....	2 88	595 68	
Blackman, C.	" Messenger for year.....	25 04	.....	.....	474 96	
Cheseldine, J. H.	" 3rd Class Exciseman from April 1 to June 30, 1901.	6 71	..... .	0 72	126 95	
Lawlor, J. J.	" " " ..	6 71	..... .	0 72	126 95	
	Salaries...	110 19	361 18	71 52	19,032 12	
	Contingencies..... ...	...	.....	.... . .	984 01	
						20,016 13
	Kingston.					
Dickson, C. T.	Salary as Collector for year.	.....	31 90	7 20	1,553 40	
Grimason, T.	" Deputy Collector for year.	.....	24 00	3 60	1,172 40	
Hanley, A.	" Asst. Accountant " ..	.....	19 96	2 88	977 16	
McFarland, C. D.	" 1st Class Exciseman " ..	.....	19 96	2 88	977 16	
Lyons, E.	" 1st " " ..	.....	19 96	2 88	977 16	
Browne, G. W.	" 2nd " " ..	.....	16 96	2 88	830 16	
O'Donnell, J.	" 3rd " " ..	.....	15 00	2 88	732 12	
Fahey, E.	" 3rd " " ..	.....	12 60	2 88	614 52	
	Salaries.....	.....	160 34	28 08	7,834 08	
	Contingencies.....	.....	.....	.....	724 41	
						8,558 49
	London.					
Alexander, T.	Salary as Collector for year.	.....	37 80	7 20	1,845 00	
Spereman, J. J.	" Special Class Exciseman for year.....	.....	31 96	4 32	1,563 72	
Davis, T. G.	" Deputy Collector for year.	.....	30 00	3 60	1,466 40	
McSween, J.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Hicks, W. H.	" Deputy Collector for year.	.....	19 96	4 68	975 36	
Coles, F. H.	" Accountant for year.....	.....	19 96	4 32	975 72	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	London—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Stewart, J.	Salary as 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Lee, E.	" 1st Class Exciseman for year	....	19 96	2 88	977 16	
Wilson, D.	" Asst. Accountant for year.	.....	19 96	2 88	977 16	
Girard, I.	" 1st Class Exciseman " ..	.....	19 96	2 88	977 16	
		Insurance.				
Boyle, P.	" 1st " " ..	71 76	29 92	2 88	895 44	
Webbe, C. E. A.	" 2nd " " .	.....	16 96	2 88	830 16	
Tracy, J. P	" 2nd " " ..	.....	16 96	2 88	830 16	
Davis, J.	" 2nd " " ..	.....	16 96	2 88	830 16	
Foster, H.	" 2nd " " ..	.....	28 80	2 88	793 32	
Whitehead, J. P.	" Deputy Collector " ..	32 48	....	2 88	614 64	
Talbot, J.	" 3rd Class Exciseman " ..	33 00	.....	2 88	624 12	
	Salaries	65 48	349 08	58 68	17,130 00	
	Contingencies	.....	.....	.....	1,185 46	
	Insurance	71 76	.. ..	... ...	....	
						18,315 46
	Ottawa.					
Costigan, H. A.	Salary as Collector for year	79 96	.....	7 20	1,512 84	
McGuire, T.	" Deputy Collector for year.	55 04	.....	3 60	1,041 36	
Slattery, R.	" 1st Class Exciseman " ..	.....	19 96	2 88	977 16	
Bennett, J. E. H.	" Deputy Collector " ..	45 00	.....	2 88	852 12	
Doyle, J. E. H.	" 3rd Class Excisman from July 1, to Aug. 1, 1900.	.....	1 25	0 24	61 01	
Hinchey, E. H.	" 3rd Class Exciseman to Aug. 31; Accountant from Sept. 1 to June 30, 1900, for year	.....	3 96	15 40	752 24	
Laporte, G.	" 3rd Class Exciseman for year	.....	12 50	2 40	610 10	
	Salaries	180 00	49 11	23 16	5,806 83	
	Contingencies	.....	.....	.....	461 72	
						6,268 55
	Owen Sound.					
Graham, W. J.	Salary as Collector for year	....	24 00	3 60	1,172 40	
Nichols, J. T.	" Deputy Collector for year.	.....	19 96	2 88	977 16	
Johnson, J. J.	" 2nd Class Exciseman " ..	.....	16 96	2 88	830 16	
Chisholm, W. N.	" Deputy Collector " ..	.....	16 96	2 88	830 16	
Blyth, A.	" 3rd Class Exciseman " ..	35 58	.....	2 88	674 04	
	Salaries	35 58	77 88	15 12	4,483 92	
	Contingencies	.....	.....	.....	664 06	
						5,147 98
	Perth.					
McLenaghan, N.	Salary as Collector for year	70 04	.....	7 20	1,322 76	
Mason, F.	" Special Class Exciseman for year	.....	30 00	4 32	1,465 68	
Earle, R. H.	" Special Exciseman, from July 1, '00 to Apl 1, 1901.	.....	18 00	3 24	878 76	
Goodman, A W.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Clarke, T	" Deputy Collector for year.	30 00	.....	2 88	567 12	
Noonan, H. T.	" " from July 3, 1900, to June 30, 1901.	29 83	.....	3 60	563 34	
Rowan, W. E.	" Deputy Collector for year.	19 96	.....	2 88	377 16	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Perth—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Egan, W.	Salary as Deputy Collector for year.	.....	.....	2 88	397 08	
George, J.	" " " ..	10 04	.....	2 88	187 08	
	Salaries..	159 87	67 96	32 76	6,736 14	
	Contingencies...	.....	.....	.....	537 04	
						7,273 18
	Peterborough.					
Hall, J. J.	Salary as Collector, from July 1 to Aug. 1, 1900.	....	4 00	0 60	195 40	
Rudkins, W.	" Deputy Collector, from July 1, 1900 to Jan. 18, 1901, and Collector, from Jan. 19 to June 30, 1901.	45 01	.....	3 60	852 75	
Howden, R.	" Deputy Collector for year.	....	16 04	2 88	781 08	
Bickle, J. W.	" " " ..	.....	13 96	2 88	683 16	
Knowlson, J. B.	" " " ..	.....	13 96	2 88	683 16	
Rork, T.	" " from Jan. 19 to June 30, 1901	16 97	.....	1 50	321 28	
	Salaries.	61 98	47 96	14 34	3,516 83	
	Contingencies.	..	.....	.....	439 14	
						3,955 97
	Port Arthur.					
Ironside, G. A.	Salary as Collector for year.	.....	19 96	3 60	976 44	
Waddingham, L. T	" Deputy Collector, from July 2, '00 to May 5, 1901	2 02	.....	2 43	39 54	
Robinson, R. S.	" Deputy Collector, from June 12 to 30, 1901.	0 13	.....	0 15	2 35	
	Salaries.	2 15	19 96	6 18	1,016 33	
	Contingencies.	.....	.....	.....	107 07	
						1,123 40
	Prescott.					
Dumbrille, J.	Salary as Collector for year.	....	36 00	7 20	1,756 80	
Gerald, W. H.	" Special Class Exciseman for year.	...	30 00	4 32	1,465 68	
Keilty, T.	" Deputy Collector for year.	.. ..	25 96	3 60	1,270 44	
Macdonald, A. B.	" Special Class Exciseman for year.	.....	24 00	4 32	1,171 68	
Marshall, F.	" 2nd Class Exciseman for year.	....	16 96	2 88	830 16	
Keeler, G. S.	" 2nd Class Exciseman for year.	.....	16 96	2 88	830 16	
Wood, J. A.	" Deputy Collector for year.	.. ..	.....	2 88	797 04	
Ferguson, J.	" 3rd Class Exciseman " .	....	15 00	2 88	732 12	
Johnston, G. E.	" " " " .	....	15 00	2 88	732 12	
White, J. B.	" Deputy Collector, from July 28, 1900, to June 30, 1901.	23 15	.....	2 64	437 84	
	Salaries.	23 15	179 88	36 48	10,024 04	
	Contingencies.	.... .	. .....	.....	410 87	
						10,434 91
	St. Catharines.					
Hesson, C. A.	Salary as Collector for year.	..	24 00	7 20	1,168 80	
Harris, J. G.	" Deputy Collector for year.	.....	34 96	2 88	962 16	
Milliken, E.	" 2nd Class Exciseman " .	.....	16 96	2 88	830 16	
Schram, R. L. H	" 3rd Class Exciseman " .	.....	24 60	2 88	677 52	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	St. Catharines—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Simpson, W. A..	Salary as Probationery Exciseman, f'm M'y 25 to J'e 30, 1901	6 71	.....	0 72	126 95	
	Salaries	6 71	100 52	16 56	3,765 59	
	Contingencies	....	.....	.....	772 85	
						4,538 44
	Stratford.					
Caven, A.....	Salary as Collector for year	.....	31 96	3 60	1,564 44	
Rennie, G.....	" Deputy Collector for year.	....	24 00	3 60	1,172 40	
Clark, A. F.....	" Accountant for year....	....	19 96	4 32	975 72	
Egener, A..	" 1st Class Exciseman for year...	...	19 96	2 88	977 16	
Waller, J... ..	" 3rd Class Exciseman for year.....	.....	15 00	2 88	732 12	
Young, Robt. E..	" Deputy Collector, from June 13 to 30, 1901.....	1 24	.....	0 14	23 61	
	Salaries	1 24	110 88	17 42	5,445 45	
	Contingencies	.....	.....	.....	605 53	
						6,050 98
	Toronto.					
Frankland, H. R.	Salary as Collector for year.....	92 16	.....	14 40	1,738 44	
Iler, B..	" Deputy Collector.....	....	31 96	7 20	1,560 84	
Gerald, C.....	" Special Class Exciseman for year.....	.....	31 96	4 32	1,563 72	
Dudley, W. H ..	" " " " ..	.....	26 60	3 60	404 76	
Henderson, W...	" Deputy Collector....	.....	30 00	3 60	1,466 40	
Blair, J. B.....	" Accountant for year.	. ..	25 63	3 96	1,253 67	
Boomer, J. B....	" Assist. Accountant for year	....	28 04	4 32	1,367 64	
Metcalf, W. F...	" Special Class Exciseman for year....	.....	24 00	4 32	1,171 68	
Boyd, S. I.	" Deputy Collector for year..	.....	24 00	2 88	1,173 12	
Dick, J. W.....	" Special Class Exciseman for year.....	.....	24 00	4 32	1,171 68	
Evans, G. T.....	" " " ..	.. ..	24 00	4 32	1,171 68	
Shanacy, M.....	" Deputy Collector for year..	...	22 04	2 88	1,075 08	
Coleman, C.....	" " " ..	.....	19 96	2 88	977 16	
Helliwell, H. N..	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
O'Leary, T. J....	" 1st " " ..	.....	19 96	2 88	977 16	
Flynn, D. J.....	" 1st " " ..	. ...	19 96	2 88	977 16	
Jamieson, R. C..	" Exciseman " ..	...	24 00	4 32	1,171 68	
Graham, W. T...	" 1st Class Exciseman " ..	.....	19 96	2 88	977 16	
Doyle, B. J.....	" 1st " " ..	.....	19 96	2 88	977 16	
Brennan, D. J...	" 1st " " ..	.....	19 96	2 88	977 16	
Cook, W. R.....	" 1st " " ..	....	20 03	2 88	975 84	
Howard, W. W. S.	" 1st " " .	. ..	21 58	3 12	973 94	
Hurst, L. B.....	" 1st " " ..	.. ..	19 17	2 88	934 20	
Barber, J. S.....	" 2nd " " .	. ..	16 96	2 88	830 16	
Murray, A. E....	" 2nd " "	.....	16 96	2 88	830 16	
Dager, H. J.....	" Deputy Collector " ..	40 04	.....	2 88	757 08	
Jones, A.....	" 3rd Class Exciseman " ..	.....	15 00	2 88	732 12	
Adams, J. S.....	" 3rd " " ..	. ....	15 00	2 88	732 12	
Coulter, A.....	" 3rd " " ..	....	25 20	2 88	691 92	
Boyd, J. F....	" 3rd " " ..	....	21 36	2 88	586 17	
Falconer, R. H..	"	29 67	.....	2 88	560 99	
Graham, A. L....	"	29 43	.....	2 88	556 38	
Elliott, T. H. ...	" Deputy Collector for year..	12 52	.....	2 88	234 60	
Dodds, E. W....	" Deputy Collector from July 1, 1900 to Oct. 31, 1900.		7 50	1 20	291 30	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Toronto—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Morton, H. McA.	Salary as Probationary Exciseman from Jan. 9, to April 30, 1901	7 78	.....	0 96	147 14	
Burns, R. J.	" Probationary Exciseman from Jan. 2, 1900 to June 30, 1901	12 41	.....	1 44	234 76	
	Salaries	224 01	634 71	125 88	33,199 39	
	Contingencies	.....	.....	.....	2,060 65	35,260 04
	Windsor.					
Kenning, J. H.	Salary as Collector for year	.....	43 96	14 40	2,141 64	
Bonteiller, G. A.	" Special Class Exciseman for year	.....	31 96	4 32	1,563 72	
Conway, B. J.	" " "	.....	30 00	4 32	1,465 68	
Crowe, W.	" Accountant for year	.....	28 04	4 32	1,367 64	
Dunlop, C.	" Deputy Collector for year	.....	25 96	3 60	1,270 44	
Gow, J. E.	" Special Class Exciseman for year	.....	24 00	4 32	1,171 68	
Brennan, J.	" Accountant for year	.....	22 11	4 32	1,081 27	
Allen, G. A.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Marcon, F. E.	" 1st " "	.....	19 96	2 88	977 16	
Jubenville, J. P.	" 2nd " "	.....	16 96	2 88	830 16	
Thomas, P.	" 1st " "	.....	18 68	2 88	913 44	
Bayard, G. A.	" 1st " "	.....	18 68	2 88	913 44	
Falconer, J.	" 3rd " "	.....	15 00	2 88	732 12	
Keogh, P. M.	" 3rd " "	.....	15 00	2 88	732 12	
Crotty, J.	" 3rd " "	.....	15 00	2 88	732 12	
Cahill, J. W.	" 3rd " "	.....	15 00	2 88	732 12	
Belleperche, A. J. E.	" Deputy Collector for year	30 00	.....	2 88	567 12	
	Salaries	30 00	360 27	68 40	18,169 03	
	Contingencies	.....	.....	.....	823 69	18,992 72
	Joliette.					
Basinet, L.	Salary as Acting Collector for year	.....	.....	3 60	996 36	
Taylor, G. W.	" Special Class Exciseman for year	.....	28 04	4 32	1,367 64	
Marion, J. E. E.	" 3rd Class Exciseman for year	37 44	.....	2 88	709 68	
Moreau, A.	" Deputy Collector for year	30 00	.....	3 60	566 40	
Forest, M.	" Deputy Collector from Jan. 19 to June 30, 1901	4 20	.....	1 50	78 67	
Ralston, T.	" Deputy Collector from May 1 to June 30, 1901, at Berthierville	4 16	.....	0 60	78 56	
	Salaries	75 80	28 04	16 50	3,797 31	
	Contingencies	.....	.....	.....	259 52	4,056 83
	Montreal.					
Lawlor, H.	Salary as Collector for year	.....	43 96	14 40	2,141 64	
Macdonald, D.	" Deputy Collector from July 1, 1900, to March 3, 1901	.....	20 00	4 80	975 20	
Toupin, F.X.J.A.	" Deputy Collector for year	.....	30 00	7 20	1,462 80	
Lecours, H. T.	" Accountant "	.....	28 04	4 32	1,367 64	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Montreal—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Caven, W.	Salary as Special Class Exciseman from July 1, 1900 to March 24, 1901 and Dy. Col. from Mar. 25, to June 30, 1901	.....	28 50	5 04	1,393 28	
Forest, E. R.	" Cashier for year	.....	25 96	7 20	1,266 84	
Fox, J. D.	" Assistant Accountant for year	.....	25 20	2 88	1,231 92	
Lane, T. M.	" Accountant for year	.....	24 00	2 88	1,173 12	
Fox, T.	" 1st Class Exciseman for year	.....	19 96	2 88	977 16	
Villeneuve, J.	" 1st " " ..	.....	19 96	2 88	977 16	
Scullion, W. J.	" 1st " " ..	.....	19 96	2 88	977 16	
MacIntyre, D.	" 1st " " ..	.....	19 96	2 88	977 16	
Hawkins, A. C.	" 1st " " ..	.....	19 96	2 88	977 16	
Bulmer, W.	" 2nd Class Ex. from July 1, 1900 to Feb. 28, 1901	.....	11 28	1 92	553 44	
Malo, T.	" 2nd Class Exciseman for yr.	.....	16 96	2 88	830 16	
Dumouchel, L.	" 2nd " " ..	.....	16 96	2 88	830 16	
Courtney, J. J.	" 2nd " " ..	.....	16 96	2 88	830 16	
Verner, F.	" 2nd " " ..	.....	16 96	2 88	830 16	
Dixon, H. G. S.	" 2nd " " ..	.....	16 96	2 88	830 16	
Manning, J.	" 2nd Class Exciseman from July 1, 1900, to March 1, 1901	.....	11 28	1 92	553 44	
Scullion, P. J.	" 2nd Class Exciseman from July 1, to 20, 1900	.....	1 25	0 24	37 39	
Millier, E.	" 3rd Class Exciseman for yr.	.....	15 00	2 88	732 12	
Baby, J.	" 3rd " " from July 1, 1900, to March. 13, 1901	.....	11 25	2 16	549 09	
Panneton, G. E.	" 3rd Class Exciseman for yr.	.....	15 00	2 88	732 12	
Pinsonneault, A.C	" 3rd Class Exciseman from July 1, 1900 to Feb. 28, 1901.	24 96	.....	1 92	473 12	
Laporte, G.	" 3rd Class Exciseman from July 1 to 31, 1900	.....	2 50	0 48	122 02	
Costigan, J. J.	" 3rd Class Exciseman for yr.	.....	15 00	2 88	732 12	
Codd H. J. S.	" 3rd " " ..	.....	15 00	2 88	732 12	
O'Flaherty, E. J.	" 3rd " " ..	.....	15 00	2 88	732 12	
Brabant, J.B.G.N	" 3rd " " ..	.....	15 00	2 88	732 12	
Bélair, A. P.	" 3rd " " ..	.....	15 00	2 88	732 12	
Ryan, W.	" 3rd " " ..	37 44	.....	2 88	709 68	
Mainville, C. P.	" 3rd " " ..	.....	15 00	2 88	732 12	
Andrews, A. A.	" 2nd " " ..	.....	27 54	2 88	757 08	
Renaud, A. H.	" 3rd " " ..	.....	25 20	2 88	691 92	
Desaulniers, J. E. A.	" 3rd " " ..	34 44	.....	2 88	652 68	
Fortier, V.	" Deputy Collector for year	30 00	.....	3 60	566 40	
Comte, L. A. A. J.	" 3rd Class Exciseman for yr.	.....	22 86	2 88	626 76	
Laurier, J. L.	" 3rd " " ..	30 72	.....	2 88	581 40	
Snowden, J. W.	" 3rd " " ..	30 72	.....	2 88	581 40	
Kearney, D. J.	" 3rd " " ..	30 00	.....	2 88	567 12	
Bruyere, H. P.	" Deputy Collector "	30 00	.....	3 60	566 40	
St. Michel, F. X.	" " " ..	24 08	.....	3 60	455 58	
Daveluy, J. P.	" 3rd Class Exciseman from Oct. 1, 1900 to June 30, 1901	31 20	.....	2 40	591 40	
Lambert, J. A.	" Probationary Exciseman from Sept. 5, 1900, to June 30, 1901	22 14	.....	2 40	418 77	
O'Donnell, M. J.	" Messenger, from Oct. 6, 1900 to June 30, 1901	18 38	.....	.....	349 84	

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total amounts paid.
	Montreal—Con.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Maranda, N. A.	Salary as Probationary Exciseman from Jan. 15 to June 30, 1901	11 54	.....	1 20	218 40	
David, T.	" Probationary 3rd Class Exciseman from Feb. 19 to June 30, 1901	9 06	.....	0 96	171 49	
Harwood, J. O. A.	" Probationary 3rd Class Exciseman from May 20 to June, 1901	2 55	.....	0 24	48 28	
Patterson, C.E.A.	" Deputy Collector, from May 23 to June, 1901	2 68	.....	0 30	50 77	
Bernard, M. J. D.	" Deputy Collector, from May 25 to June, 1901	2 55	.....	0 30	48 22	
	Salaries	372 46	643 42	150 84	36,848 09	
	Contingencies	.....	.....	.....	4,134 22	
						40,982 31
	Quebec.					
LaRue, G.	Salary as Collector for year	.....	37 80	7 20	1,845 00	
Cahill, J. H.	" Deputy Collector for year	....	.....	3 60	1,361 39	
Coleman, J. J.	" 1st Class Exciseman "	.....	19 96	2 88	977 16	
Rouleau, J.	" 3rd " "	...	15 00	2 88	732 12	
LeMoine, J.	" 3rd " "	...	15 00	2 88	732 12	
Bourget, O.	" 3rd " "	.....	15 00	2 88	732 12	
Lépine, L.	" 3rd " "	.....	15 00	2 88	732 12	
Bourassa, J.	" 3rd " "	.....	26 16	2 88	720 96	
LaRue, A.	" Deputy Collector "	.....	31 44	3 60	864 96	
Beaulieu, J. B.	" 3rd Class Exciseman "	.....	22 86	2 88	626 76	
Timmons, P.	" 3rd " "	.....	22 86	2 88	626 76	
Pelletier, N. G.	" Deputy Collector "	25 04	.....	3 60	471 36	
Blair, A.	" " "	.....	.....	3 60	196 32	
	Salaries	25 04	221 68	44 64	10,619 15	
	Contingencies	.....	.....	.....	3,785 50	
						14,404 65
	Sherbrooke.					
Simpson, A. F.	Salary as Collector for year	.....	30 76	7 20	1,502 04	
Quinn, J. D.	" Special Class Exciseman for year	.....	24 00	4 32	1,171 68	
Murray, D.	" 1st Class Exciseman from July 1, to Oct. 31, 1900	.....	6 64	0 96	325 72	
Chartier, S.	" Deputy Collector for year	57 72	.....	3 60	1,093 68	
Deland, A. N.	" " from July 1 to Oct. 31 1900	10 80	.....	1 20	204 64	
Bowen, F. C.	" 3rd Class Exciseman for year	35 16	.....	2 88	666 96	
Rousseau, E. H.	" Deputy Collector "	25 04	.....	3 60	471 36	
Grosbois, C. B. de	Deputy Collector from July 1, 1900 to June 20, 1901 and 3rd Class from June 21, 1900, to June 30, 1901	27 63	.....	2 88	522 40	
	Salaries	156 35	61 40	26 64	5,958 48	
	Contingencies	.....	.....	.....	877 66	
						6,836 14
	Sorel.					
Fortier, J. JO.	Salary as Collector for year	.....	20 00	3 60	976 40	
	Contingencies	.....	.....	.....	25 95	
						1,002 35

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Deductions for Retirement.	Deductions for Superannuation.	Deductions for Guarantee.	Amounts paid.	Total Amounts paid.
	St. Hyacinthe.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Boivin, C. A.	Salary as Collector from July 1, 1900 to March 31, 1901	.....	14 94	2 70	732 33	
Benoit, L. V.	" Deputy Collector from Jan. 1, to March 31, 1901 and Collector from April 1 to June 30, 1901	21 18	.....	2 63	434 24	
Daveluy, J. P	" 3rd Class Exciseman from July 1 to Aug. 31, 1900.	6 24	.....	0 48	118 28	
Tétreault, J	" Deputy Collector for year	4 96	.....	3 60	91 44	
Desmarais, H. F.	" " "	4 96	.....	3 60	91 44	
Murray, D	" 1st Class Exciseman from Nov. 1, 1900 to June 30, 1901	.....	13 28	1 92	651 44	
Deland, A. N.	" Deputy Collector from Nov. 1, 1900 to June 30, 1901	21 60	.....	2 40	409 28	
Bousquet, J. O	" Probationery Exciseman. from March 1 to June 30, 1901	10 90	.....	0 96	189 04	
Dumaine, J. D. E.	" Probationery Exciseman. Feb. 19 to June 30, 1901	9 06	.....	0 96	171 49	
Morin, J. P	" Deputy Collector from April 1 to June 30, 1901	9 99	.....	0 90	189 09	
	Salaries	87 99	28 22	20 15	3,078 07	
	Contingencies	...	...	.....	755 99	
						3,834 06
	Three Rivers.					
Hébert, C. D.	Salary as Collector for year	.....	24 00	3 60	1,172 40	
Duplessis, C. Z	" 3rd Class Exciseman for year	....	15 00	2 88	732 12	
	Salaries	...	39 00	6 48	1,904 52	
	Contingencies	..	.....	.....	142 30	
						2,946 82
	Victoriaville.					
Poirier, J. N	Salary as Collector for year	.....	24 52	3 60	671 88	
Bousquet, J. O	" 3rd Class Exciseman from July 1, 1900 to Febry 28, 1901	19 84	...	1 92	375 27	
	Salaries	19 84	24 52	5 52	1,047 15	
	Contingencies	.....	.....	.....	131 33	
						1,178 48
	St. John, N.B.					
Atherton, R.	Salary as Collector from July 1 to Oct. 31, 1900	.....	10 64	2 40	520 28	
Clarke, J. A	" Deputy Collector for year	...	24 00	3 60	1,172 40	
Belyea, T. H.	" Accountant "	.....	19 96	4 32	975 72	
McCloskey, J. A.	" 1st Class Exciseman "	.....	19 96	2 88	977 16	
Fitzpatrick, W.J.	" 1st " "	.....	19 96	2 88	977 16	
Geldart, O. A.	" 1st " "	.....	19 96	2 88	977 16	
Ferguson, J. C.	" 2nd " "	.....	16 96	2 88	830 16	
Smyth, B. B.	" 2nd " "	.....	9 87	1 44	484 50	
Hill, A. M	" Deputy Collector "	.....	10 04	2 88	487 08	
Dibblee, W	" " "	.....	3 72	2 88	293 40	
	Salaries	...	155 07	29 04	7,695 02	
	Contingencies	.....	.....	.....	296 95	
						7,991 97

SESSIONAL PAPER No. 12

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total Amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Halifax, N.S.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Grant, H. H.	Salary as Collector for year		36 00	7 20	1,756 80	
King, R. M	" Deputy Collector for year		25 96	3 60	1,270 44	
James, T. C.	" Accountant "		19 96	4 32	975 72	
Carroll, D	" 1st Class Exciseman "		19 96	2 88	977 16	
Blethen, C. W.	" 1st " "		19 96	2 88	977 16	
Wainwright, F.G.	" 2nd " "		16 96	2 88	830 16	
Hubley, H. H.	" 2nd " "		16 96	2 88	830 16	
Tompkins, P.	" 3rd " "		15 00	2 88	732 12	
Hagarty, P.	" 3rd " "		15 00	2 88	732 12	
Munro, H. D.	" 3rd " "		15 00	2 88	732 12	
Gorman, A. M.	" 3rd " "		13 20	2 88	643 92	
	Salaries		213 96	38 16	10,457 88	
	Contingencies				401 75	
						10,859 63
	Pictou.					
Fraser, P.	Salary as Collector for year		19 96	3 60	976 44	
McDonald, A. J.	" Deputy Collector for year	34 96		2 88	662 16	
	Salaries	34 96	19 96	6 48	1,638 60	
	Contingencies				340 34	
						1,978 94
	Charlottetown, P.E.I.					
Nash, S. C	Salary as Collector for year		24 00	3 60	1,172 40	
Moore, T.	" Deputy Collector for year		19 96	2 88	977 16	
	Salaries		43 96	6 48	2,149 56	
	Contingencies				93 31	
						2,242 87
	Winnipeg.					
Gosnell, T. S	Salary as Collector for year		39 60	7 20	1,933 20	
Watson, W. W.	" Deputy Collector for year			3 60	1,361 40	
Code, A.	" Accountant "		25 96	4 32	1,269 72	
Hawkins, W. L.	" " "		24 00	4 32	1,171 68	
Girdlestone, R. J. M	" Deputy Collector "		19 96	2 88	977 16	
Saucier, X.	" 1st Class Exciseman "		18 68	2 88	913 44	
Sparling, J. W.	" Deputy Collector "	40 04		2 88	757 08	
Verner, T. H.	" 1st Class Exciseman "		30 53	2 88	837 84	
LaRivière, A. C.	" 2nd " "		28 80	2 88	793 32	
Conklin, W. M.	" 3rd " "	32 16		2 88	609 96	
Barnes, G	" Deputy Collector "	30 00		2 88	567 12	
Long, W. H.	" 3rd Class Exciseman "	30 00		2 88	567 12	
Ross, H. E.	" Deputy Collector "		11 92	2 88	385 20	
Jameson, S. B.	" " "		9 00	2 88	288 12	
McNiven, J. D.	" " "	12 52		2 88	234 60	
	Salaries	144 72	208 45	51 12	12,666 96	
	Contingencies				1,797 78	
						14,464 74
	Calgary.					
Thomas, P.	Salary as Acting Collector for year		22 04	3 60	1,074 36	
Fletcher, R. W.	" Deputy " "	40 04		2 88	757 08	
Osborne, F. A.	" " " "		21 00	2 88	576 12	
Ives, G. C.	" " " "	19 96		2 88	377 16	
	Salaries	60 00	43 04	12 24	2,784 72	
	Contingencies				931 57	
						3,716 29

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts Paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Vancouver.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Miller, J. E.	Salary as Collector for year	.....	30 00	7 20	1,462 80	
Parkinson, E. B.	" Deputy Collector for year	55 04	.....	3 60	1,041 36	
Wolfenden, W.	" " "	34 96	.....	3 60	661 44	
Cargill, W.	" " "	31 44	.....	3 60	594 96	
Bishop, A.	Salary as Deputy Collector from July 1, 1900, to Feb. 28, 1901	20 00	.....	2 40	377 60	
Swannell, F. W.	Salary as Deputy Collector for year	30 00	.....	3 60	566 40	
McCutcheon, H.	" " "	30 00	.....	3 60	566 40	
Howell, T.	" " "	19 96	.....	3 60	376 44	
Stevens, D. B.	" " "	19 96	.....	3 60	376 44	
Parson, C. H.	" " "	10 04	.....	3 60	186 36	
McCraney, H. P	" " "	40 04	.....	3 60	756 36	
Thorburn, Jas.	Salary as 3rd class Exciseman from Feb. 19 to June 30, 1901	9 06	.....	0 96	171 49	
Hodder, W. E.	Salary as Deputy Collector from April 9 to June 30, 1901	6 00	.....	0 60	113 40	
	Salaries	306 50	30 00	43 56	7,251 45	
	Contingencies	.....	.....	.....	4,061 25	
						11,312 70
	Victoria.					
Jones, R.	Salary as Collector for year	.....	30 60	7 20	1,462 80	
Henwood, G.	" Exciseman for year	.....	18 96	2 88	859 47	
O'Sullivan, D.	" Deputy Collector for year	....	34 56	3 60	951 84	
Ridgman, A. H.	" 3rd class Exciseman "	.....	26 16	2 88	720 96	
McAloney, J. A.	" Deputy Collector "	15 00	.....	3 60	281 40	
	Salaries	15 00	109 68	20 16	4,276 47	
	Contingencies	.....	.....	.....	956 43	
						5,132 90

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	DISTRICT INSPECTORS.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
	Ontario.					
Dingman, N.J.	Salary for year		38 00	9 00	1,853 00	
	Contingencies				634 49	
						2,487 49
Stratton, W. C.	Salary for year		48 00	9 00	2,343 00	
	Contingencies				237 18	
						2,580 18
Gow, J.	Salary for year		50 00	9 00	2,441 00	
	Contingencies				506 51	
						2,947 51
	Quebec.					
Beauchamp, J. P.	Salary for year		42 00	9 00	2,049 00	
	Contingencies				117 97	
						2,166 97
Rinfret, C. I.	Salary for year	125 00		9 00	2,366 00	
	Contingencies				168 79	
						2,534 79
	New Brunswick.					
Burke, T.	Salary for year		50 00	9 00	2,441 00	
	Contingencies				452 46	
						2,893 46
	Manitoba.					
Barrett, J. K.	Salary for year		50 00	9 00	2,441 00	
	Contingencies				196 15	
						2,637 15
	British Columbia.					
Gill, W.	Salary for year		50 00	9 00	2,441 00	
	Contingencies				793 94	
						3,234 94
	Chief Inspector.					
Gerald, W. J.	Contingencies					352 40
	Inspector of Bonded Factories.					
Stratton, W. C.	Contingencies					217 73

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Excise Contingencies.	$ cts.	$ cts.
Potvin, Napoleon	Express and freight charges	98 94	
Gooderham & Worts	Spirits and freight	22 51	
Electric Railway Co.	Tickets for department	10 00	
Whitehead, Mrs. J.	Cleaning safe and storerooms	77 75	
Lymans, Sons & Co.	Flasks, bottles, stoppers, &c	11 83	
Pritchard-Andrews Co., The	Stamps, daters, stencils and repairs	200 60	
Fréchette, A.	Technical proof reading and translation	27 00	
The Sheriff, District of Montreal	Expenses in connection with the sheriff's attack *re* Finlayson & Grant	119 42	
Rinfret, Dr. C. I.	Expenses incurred in attending Excise promotion examinations, Montreal	67 75	
American Bank Note Co.	To pay for stamps and labels supplied	19,049 24	
British American Bank Note Co.	" "	3,254 45	
Edwards, W. C. & Co., Limited	Lumber and cartage	67 50	
Geraldi, Charles	Travelling expenses	208 80	
Tucker & Reeves	Locks, keys and padlocks	166 99	
Graves Bros.	Screws, nails, hooks, oil, &c	45 06	
Dominion Express Co.	Freight charges	7 04	
Canadian Express Co.	"	12 80	
Registrar Exchequer Court	Writ of assistance for L. V. Benoit	2 90	
Eimer & Amend.	Burettes, flasks, &c	97 00	
Mulvena, H. W.	Magistrate's fees in *re* Regina *vs.* T. Brooks	16 25	
Hagan, James	Petty expenses	9 70	
Oertling, L	24 gilt hydrometers	569 02	
Chater, Edwin	100 thermometers bulb guards	35 00	
Cochran, Geo.	Constable's fees in *re* Regina *vs.* M. Healy	11 29	
	Total General Contingencies		24,188 84
	Law Costs.		
Gouin, Lomer	Law costs in *re* Regina *vs.* R. Archambault	10 00	
	" Regina *vs.* C. Sénécal	24 60	
	" Regina *vs.* P. J. Scullion	93 20	
	" Regina *vs.* D. Bouvrette	20 00	
	" Regina *vs.* C. Sénécal	150 00	
	" Regina *vs.* H. Paquin	10 00	
	" Regina *vs.* Max. Martel	43 90	
	" Regina *vs.* D. Rousseau	20 50	
			372 20
Roger, G. M.	Law costs in *re* Regina *vs.* M. Healy		15 40
Broderick, J. S	" Regina *vs.* T. Brooks		40 00
Ferguson, J. M.	" Regina *vs.* Finlayson & Grant		500 00
Pouliot, J. C.	" Regina *vs.* D. E. Morin		74 20
Letellier, Blaise	" Regina *vs.* J. Rodrigue		36 00
Plamondon, J. D.	" Regina *vs.* Paul Burelle		130 20
Leduc, J. D.	" Regina *vs.* J. E. Provost	10 00	
	" Regina *vs.* E. Poulin and R. Boyer	42 50	
			52 50
Simard, A. H.	Law costs in *re* Regina *vs.* Jérôme Tremblay		28 40
Alain, L.	" Regina *vs.* Adelard Roy.	29 05	
	Constable's fees in *re* Regina *vs.* Adelard Roy	6 80	
			35 85
Wright, S. W.	Sheriff's fees in *re* Regina *vs.* A. Gareau	5 19	
	" Regina *vs.* Annie Mageau	5 19	
			11 18
Ritchie, W. B. A	Professional services in *re* Regina *vs.* D. Walker		1 00
	" Regina *vs.* J. Murray		6 00
Taschereau, L. A	To reimburse T. Lachance in *re* appeal Quebec Seizure No. 409		100 00
	Total Law Costs		1,412 93

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Place of Residence.	Service.	Amounts paid.	Totals.
		Commission to Customs Officers.	$ cts.	$ cts.
Smith, A. H	Sudbury, Ont	From June 1, 1899, to June 30, 1901	343 04	
Cameron, A. McK.	Meaford, Ont.	From July 1, 1899, to June 30, 1900	150 00	
Watson, Geo	Collingwood, Ont.	" "	250 00	
Binney, J. W.	Moncton, N.B.	" "	250 00	
Anderson, J. J.	Sackville, N.B.	" "	116 22	
Wallace, G. H.	Sussex, N.B.	" Oct., 19, 1900	172 40	
Street, A. F.	Fredericton, N.B.	" June 30, 1900	250 00	
Park, W. A.	Newcastle, N.B.	" " 1900	200 00	
Britton, W. H	Gananoque, Ont.	" " 1901	300 00	
Veniot, P. J	Bathurst, N.B.	" " 1900	93 05	
Ratchford, C. E.	Amherst, N.S.	" " 1901	300 00	
McPherson, J	North Sydney, N.S	" " 1901	400 00	
McDonald, J. F.	New Glasgow, N.S.	" " 1901	346 78	
Boyd, A	Antigonish, N.S.	" " 1900	107 54	
Tennant, J. F.	Gretna, Man	" " 1900	150 00	
Gilhuly, R. H.	Selkirk, Man.	" " 1900	86 97	
Champness, F	Lethbridge, N.W.T	" " 1900	138 93	
Rose, G. C	Cascade City, B.C.	" Jan. 5, 1901	222 23	
Clarke, C	Fort Steel, B.C.	" June 30, 1900	88 28	
Gilpin, R. R	Grand Forks, B.C.	" " 1900	200 00	
Keay, W. S	Cranbrook, B.C.	" " 1900	250 00	
Hay, M. G.	Ridgetown, Ont.	" " 1900	120 79	
Anderson, T. E	Napanee, Ont.	From July 1, 1900, to June 30, 1901	250 00	
Stanley, T. D.	St. Mary's, Ont	" " 1901	200 00	
Brodeur, S. A	Valleyfield, Que	" " 1901	250 00	
Blair, H. C.	Truro, N.S.	" " 1901	248 20	
Campbell, G.	Moyie City, B.C.	Guarantee 6 mos. paid up to June 30, 1900	1 80	
Meyer, F. E.	Vernon, B.C.	" " 1900	1 80	
Bailey, E. R	Kelona, Man	" " 1900	1 80	
		Total Commission to Custom Officers		5,489 83
		Commission on Tobacco Stamps.		
Forest, Z.	L'Epiphanie, Que.	Allowance of 5 p. c. on sale of stamps	32 62	
Grignon, A.	St. Eustache, Que.	" "	18 91	
Roy, J.	St. Alexis, Que.	" "	18 75	
Ferland, E	"	" "	0 50	
		Total		70 78

APPENDIX B.—No. 1.—Details of Excise Expenditures, 1900–1901—*Continued.*

To whom paid.	Service.	Amounts. paid.	Totals.
	Duty-pay.	$ cts.	$ cts.
Gerald, Charles	From July 1, 1900, to June 30, 1901	200 00	
Jamieson, R. C.	" "	150 00	
O'Leary, T. J.	" "	100 00	
Howard, W. W. S.	" "	100 00	
Brennan, D. J.	" "	100 00	
Hurst, L. B.	" "	100 00	
Flynn, D. J.	" "	100 00	
Doyle, B. J.	" "	100 00	
Bouteiller, G. A.	" "	200 00	
Gow, J. C.	" "	150 00	
Brennan, J.	" "	100 00	
Thomas, R.	" "	100 00	
Bayard, G. A.	" "	100 00	
Marcon, F. E.	" "	100 00	
Cahill, J. W.	" "	100 00	
Keogh, P. M.	" "	100 00	
Falconer, J. E.	" "	100 00	
Crotty, John	" "	100 00	
Dawson, W.	" "	100 00	
Bish, P.	" "	100 00	
Kilroy, E. F.	" "	100 00	
Howie, Alex.	" "	150 00	
Standish, J. G.	" "	100 00	
McCoy, W.	" "	150 00	
Baby, W. A. D.	" "	100 00	
Irwin, S.	" "	100 00	
Weir, Jas.	" "	150 00	
Gerald, W. H.	" "	150 00	
Macdonald, A. B.	" "	150 00	
Johnston, G. E.	" "	100 00	
Keeler, G. S.	" "	100 00	
Mason, F.	" "	100 00	
Goodman, A. W.	" "	100 00	
Taylor, G. W.	" "	150 00	
Moreau, Aug.	" "	100 00	
Allen, S. A.	" "	75 00	
Caven, W.	" "	150 00	
Millier, E.	" "	150 00	
Scullion, W. J.	" "	100 00	
Coleman, J. J.	" "	150 00	
Lépine, L.	" "	75 00	
Cameron, D. M.	" "	200 00	
Dick, Walter	" "	200 00	
Quinn, J. D.	" "	150 00	
Malo, T.	From July 1, 1900 to June 30, 1901	100 00	
Traversy, F. X.	" "	100 00	
Murray, D.	" "	100 00	
Weyms, C.	" "	100 00	
Waller, J.	" "	200 00	
Foster, H.	" Nov. 30, 1901	41 66	
Allen, G. A.	From January 1, 1901, to June 30, 1901	75 00	
Ralston, T.	From April 30, 1901 "	20 27	
Desaulniers, J. E. A.	From January 1, 1901 "	50 00	
Woodward, G. W.	From December 3, 1900 "	57 94	
McFee, A. C.	From August 6, 1900 "	90 31	
Walsh, D. J.	From July 1, 1900, to December 31, 1900	50 00	
Bernard, N. J. D.	From June 4, 1901, to June 30, 1901	7 50	
	Total duty-pay		6,342 68
	Grand total		372,105 09

APPENDIX B —No. 1.—Details of Excise Expenditures, 1900-1901—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	Statement No. 1—Concluded.	$ cts.	$ cts.
	ADD—Printing	6,365 28	
	Stationery	2,002 29	
	Lithographing	695 00	
			9,062 57
	Preventive Service:—		
	Salaries	2,749 88	
	Contingencies	8,444 07	
			11,188 19
	Authorized disbursements (less superannuation, insurance, retirement and guarantee)		392,355 85
	ADD—Balances due to Collectors, July 1, 1900	49 08	
	" " June 30, 1901	343 98	
			393 06
			392,748 91
	LESS—Balances due by Collectors, July 1, 1900	367 75	
	" " June 30, 1901	49 08	
			416 83
	Actual disbursements agreeing with Statement No. 4, page 12		392,332 08

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX B—*Continued.*

No. 2.—Details of Fees paid to Cullers for the Fiscal Year ended June 30, 1901.

Office.	Article.	Names of Cullers.	Amounts paid.	Totals.
			$ cts.	$ cts.
Quebec	Square timber	Bergeron, Joseph	700 00	
	" "	Frederick, Antoine	700 00	
	" "	Kelly, Edward	700 00	
	" "	McKendry, Daniel	700 00	
	" "	McPeak, William	700 00	
	" "	O'Brien, Martin O	700 00	
				4,200 00

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

No. 3.—Details of Cullers' Expenditures for the Fiscal Year ended June 30, 1901.

Office.	Names.	Nature of Service.	Deductions for		Amounts Paid.	Totals.	Grand Totals.
			Retirement.	Superannuation.			
			$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Quebec	Patton, James	Supervisor of Cullers for the year		42 00	2,058 00		
	Harney, Thomas	Book-keeper and Cashier		16 96	833 04		
	Whelan, W. F	Specification Clerk		15 00	735 00		
	Gallagher, F	"		15 00	735 00		
	Bellerive, G	"		15 00	735 00		
	Croteau, J. M	"	37 44		712 56		
			37 44	103 96		5,808 60	
		Contingencies.					
	Foley, Mary	Charwoman			96 00		
	Duggan & Co., James	Night watchman			35 00		
	Fitzgerald, Martin	Office boy			120 00		
	Harney, Thomas	Petty expenses			36 20		
	Post Office, Quebec	Rent of drawer			6 00		
	Hearn, John, estate of	Rent of office			625 00		
	Bell, Telephone Co.	Rent of telephone			58 65		
	Rancour, Noël	Ice for season			10 00		
	Mulroney, W J. & G	Ink and mucilage			4 25		
	Gas Co., Quebec	Gas consumed			28 00		
	Kane, J. R	Plumbing, &c			67 65		
	Canada Lumberman	Subscription to paper			1 00		
	Chronicle Printing Co.	" "			3 00		
	Fitzgerald & Co., J.	Removing snow, &c			20 50		
	Turgeon, P. L.	Soaps, brooms, &c			9 30		
	Holmes, Margaret	General house cleaning			47 00		
	Kelly, Edward	Expenses to Montreal			24 55		
	Guérard, Louis	Placing double windows, &c			18 75		
	Arnold, Thomas	Cartage of snow			25 00		
		Total contingencies				1,235 85	

APPENDIX B—*Continued.*

No. 3.—DETAILS of Culler's Expenditures for the Fiscal Year ended June 30, 1901—*Concluded.*

Office.	Names.	Nature of Service.	Amounts Paid.	Totals.	Grand Totals.
		Cullers' Expenses.	$ cts.	$ cts.	$ cts.
QUEBEC—*Con.*	Bergeron, Joseph	Expenses	125 52		
	Frédérick, Antoine	"	156 92		
	Kelly, Edward	"	103 12		
	McKendry, Daniel	"	77 12		
	McPeak, William	"	113 45		
	O'Brien, Martin	"	155 06		
		Total Cullers' expenses		731 19	
		Paid to Retired Cullers.			7,775 64
	Jobin, Jacques	Superannuation	200 00		
	Morrisette, Joseph	"	200 00		
	Demers, Louis	"	83 34		
	Dorval, Philippe	"	200 00		
	Walsh, William	"	200 00		
	Villeneuve, Jacques	"	200 00		
	Bédard, Jérémie	"	200 00		
	McNaughton, John	"	200 00		
	Beaupré, Noël	"	200 00		
	Frenette, Joseph	"	200 00		
	Malone, James C	"	200 00		
	Duggan, Edward	"	200 00		
	Gilchen, Thomas	"	33 34		
	McInenly, Thomas	"	200 00		
	Laflamme, Jos	"	200 00		
	Patry, Thomas	"	200 00		
	Courchy, Charles	"	200 00		
	Lynch, John B	"	200 00		
	Murphy, Thomas	"	200 00		
	Demers, F. X	"	200 00		
	Malone, Thomas	"	200 00		

Dorval, Geo	"		200 00		
Ferland, Pierre	"		200 00		
Barsolo, E	"		200 00		
McCormick, John	"		200 00		
Morency, Denis	"		200 00		
Vachon, J. B	"		200 00		
Powers, Richard	"	and arrears from Aug. 9, 1895, to June 30, 1901	1,179 05		
		Total paid to retired Cullers		6,295 73	
		Grand total			18,271 37
		ADD—Printing		6 05	
		Stationery		29 28	
					35 33
		Authorized disbursements (less deduction for superannuation and retirement)			18,306 70
		ADD—Balance due by Supervisor, June 30, 1900			75 00
					18,381 70
		LESS—Balance due by Supervisor, July 1, 1901			75 00
		Actual disbursements, agreeing with Statement No. 8, page 18			18,306 70

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures for the Year ended June 30, 1901.

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario.	$ cts.	$ cts.
Belleville	Floody, E	For his portion of seizure No. 6	21 15	
		" " Genl. " 4345	39 38	
				60 53
	Fairbairn, R. D.	" " " " 4345		39 37
	McAllister, A.	To pay informer penalty in seizure No. 6.		25 00
Brantford	Bill, J. E.	For his portion of seizure No. 44		1 38
	Cameron, D. M.	" " " 44		1 37
Cornwall	Curless, C.	" " " 11		27 58
Guelph	Floody, E	" " " 87		22 59
	Powell, J. B.	" " " 87		22 58
	Fairbairn, R. D.	" " " 87		22 59
Hamilton	Floody, E.	" " " 35	14 36	
		" " " 36	22 59	
				36 95
	Fairbairn, R. D.	" " " 35	14 35	
		" " " 36	22 59	
				36 94
	Miller, W. F.	" " " 35	14 35	
		" " " 36	22 58	
				36 93
	Crawford, W. P.	" " " 35		14 35
Kingston	Floody, E.	" " Genl. " 4651	20 00	
		" " " " 4652	25 00	
				45 00
Ottawa	Floody, E.	" " " 178	28 05	
		" " " " 4662	25 00	
				53 05
	Costigan, H. A.	" " " 187	14 63	
		" " " 189	18 82	
		" " " 190	7 73	
		" " " 191	5 00	
		" " " 192	29 00	
			75 18	
		Less—Overpaid in previous distribution	10 65	
				64 53
		To pay informer penalty in seizure No. 190	5 00	
		" " Genl. " 4662	25 00	
		" " " 192	25 00	
				55 00
Peterborough	Floody, E.	For his portion of seizure No. 20	13 58	
		" " " 21	17 92	
		" " Genl. " 4341	28 75	
				60 25
	Fairbairn, R. D.	" " " 20	13 58	
		" " " 21	17 92	
		" " Genl. " 4341	28 75	
				60 25
	Howden, R.	" " " 21		17 91
Prescott	Gerald, W. H.	" " " 36		23 75
	Keeler, W. H.	" " " 36		23 75
Owen Sound	Graham, W. J.	" " " " 4676		5 00
St. Catharines	Hesson, C. A.	" " " 18		4 00
	Schram, R. L.	" " " 18		4 00
	Floody, E	" " " 26		31 24
Stratford	Floody, E.	" " " " 4473	27 50	
		" " " 101	16 24	
		" " " 101	26 87	
				70 61
	Fairbairn, R. D.	" " " " 4473	27 50	
		" " " 101	16 24	
		" " " 101	26 88	
				70 62

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures, 1900-1901—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Ontario—Concluded.	$ cts.	$ cts.
Stratford	Caven, A.	For his portion of seizure, No. 101		16 24
	Egener, A.	" " " 101		16 23
Toronto	Floody, E.	" " " 341	18 34	
		" " " 342	16 72	
		" " " 364	5 00	
		" " " 372	2 50	
		" " Genl. " 4444	89 38	
		" " " " 4445	28 25	
				160 19
	Fairbairn, R. D.	" " " 341	18 33	
		" " " 342	16 72	
		" " Genl. " 4444	89 37	
		" " " " 4445	28 25	
				152 67
	Iler, B.	" " " 341	18 33	
		" " " 342	16 71	
		" " " 374	7 75	
				42 79
	Boomer, J. B.	" " " 372		2 50
	Falconer, J. B.	" " " 378		5 00
	Cook, W. R.	" " Genl. " 4619		100 00
	Frankland, H. R.	" " " 374	7 75	
		To pay informer penalty in seizure " 378	5 00	
				12 75
Windsor	Floody, E	For his portion of seizure No. 64	37 65	
		" " " 65	23 22	
		" " " 66	48 22	
		" " " 67	23 21	
		" " " 68	97 85	
				230 15
	Dunlop, C.	" " " 65	23 22	
		" " " 66	48 22	
		" " " 67	23 22	
				94 66
		Quebec.		
Montreal	Tansey, J. P. F.	For his portion of seizure No. 513		5 25
	Brabant, J. B. G. N.	" " " 897	1 75	
		" " " 958	25 00	
		" " " 975	0 08	
		" " " 979	29 65	
		" " " 980	0 08	
		" " " 1030	21 45	
		" " " 1042	29 02	
				107 03
	Warren, J. S.	" " " 879		1 75
	Cinq-Mars, A.	" " " 958	25 00	
		" " " 975	0 07	
		" " " 979	29 65	
		" " " 980	0 09	
		" " " 1030	21 45	
		" " " 1042	29 02	
				105 28
	Watkins, J. A.	" " 980	0 08	
		" " 994	0 75	
				0 83
	Ryan, W.	" " 994		0 75
	Beauchamp, J. P.	" " 1026		1 47
	Lawlor, H.	" " 1026	1 47	
		" " 1029	8 47	

APPENDIX B—*Continued.*

No. 4.—Distribution of Seizures, 1900-1901—*Continued.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
		Quebec—Continued.	$ cts.	$ cts.
Montreal—*Con.*	Lawlor, H.....	For his portion of seizure No. 1031.....	4 05	
		" " 1036..	0 13	
		" " 1043.....	43 22	
		" " 1045.....	24 86	
		" " 1046.....	32 63	
		" " 1047.....	26 60	
		" " 1048.....	24 55	
				165 98
		To pay informer penalty in seizure No. 1031	5 00	
		" " 1043	50 00	
		" " 1048	50 00	
		" " 1051	50 00	
		" " 1057	5 00	
		" " 1058	50 00	
		" " 1059	50 00	
		" " 1060	5 00	
				265 00
	Kearney, D. J.....	For his portion of seizure No. 1026	1 46	
		" " 1027....	0 30	
		" " 1029.....	8 48	
		" " 1031.....	4 05	
		" " 1035.. ...	14 52	
		" " 1036.....	0 12	
		" " 1041.....	2 76	
		" " 1043... .	43 21	
		" " 1045 . ..	24 86	
		" " 1046.....	32 64	
		" " 1047.....	26 60	
		" " 1048	24 55	
		" " 1051... ..	21 75	
				205 30
	Jones, F. L.	" " 1003.....	6 14	
		" " 1038.....	1 50	
				7 64
	Compte, J....	" " 1035.....	14 53	
		" " 1041.....	2 77	
		" " 1043	43 21	
		" " 1051	21 75	
			82 26	
		Less—Overpaid in previous distribution..	2 22	
				80 04
	Fox, T.....	For his portion of seizure No. 2,160	.....	10 00
Quebec.. ...	Lambert, E. A.....	" " 439 .. .	37 00	
		" " 501.....	39 90	
				76 90
	Bourget, O..... .	" " 443	10 00	
		" " 492.....	14 50	
		" " 507.....	5 48	
				29 98
	Lépine, L	For his portion of seizure No. 443.....	.....	
	Trudel, E.	" " 443.....	10 00	10 00
		" " 481.....	15 00	
		" " 492.....	14 50	
		" " 507.....	5 47	
				44 97
	Pelletier, N. G	" " 452.....	.....	5 00
	Bouliane, S.	" " 495.....	46 60	
		" " 496.	46 10	
		" " 498.....	48 10	
				140 80
	LaRue, G	To pay informer penalty in seizure No. 452		5 00

APPENDIX B—*Continued.*

No. 4.—DISTRIBUTION of Seizures, 1900–1901—*Concluded.*

Divisions.	To whom paid.	Service.	Amounts paid.	Totals.
			$ cts.	$ cts.
Sherbrooke	Simpson, A. F	For his portion of seizure No. 86.....	0 96	
		" " 197... .. .	59 67	
		" " 199.....	21 90	
				82 53
		To pay informer penalty in seizure No. 197	25 00	
		" " 197	25 00	
		" " 199	25 00	
				75 00
St. Hyacinthe..	Boivin, C. A	For his portion of seizure No. 39	2 00	
		" " 59	1 00	
				3 00
	Simpson, A. F.....	" " 55	4 00	
		" " 61	1 00	
				5 00
St. Johns, Que.	Simpson, A. F.....	" " 76	.....	5 21
	Paquet, J. T	" " 76	.....	5 21
	Brabant, J. B. C. B.	" " 81	.....	18 35
St. John, N.B..	Floody, E	" " 94	39 90	....
		" " 96	49 00	.....
				88 90
	Fitzpatrick, W. G ..	" " G 2,494	.....	2 40
Halifax	Floody, E	" " 169	14 01	
		" " G 4,484	200 00	
		" " G 4,486	25 00	
		" " G 4,557½.....	200 00	
				439 01
	Blethen, G. W.....	" " G 4,634	... .	50 00
	Tompkins, P.....	" " 169	.....	14 01
	Grant, H. H	" " 169	.....	14 01
	Fairbairn, R. D	" " 169	... .	14 00
Winnipeg.....	Gosnell, T. S	" " 53	.. ..	4 88
	Barrett, J. K.....	" " 53	4 87	
		" " 62	20 50	
		" " 63	5 00	
		" " 64	19 00	
				49 37
		Grand total	.....	3,910 15
		LESS—Refund	.....	50 00
				3,860 15

RECAPITULATION.

Ontario.....	$ 1,770 30
Quebec	1,413 27
New Brunswick.....	91 30
Nova Scotia.....	531 03
Manitoba.....	54 25
Total.....	$ 3,860 15

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX B—*Continued.*

No. 5.—Details of Sundry Minor Expenditures for the Fiscal Year ended June 30, 1901.

To whom paid.	Services.	Amounts paid.	Totals.
		$ cts.	$ cts.
Halloran, G. F. O.	Law costs in *re* Rex *vs.* J. A. Gagnon	49 45	
American Bank Note Co	Printing law stamps	36 25	
		85 70	
	Add—Printing	5 67	
	Total		91 37
	Inspection of Staples.		
Roy, Geo	Salary as chief inspector of raw hides	1,500 00	
"	Travelling expenses and rent, &c	160 98	
Wills, E. A	Purchases of samples of grain and travelling expenses of delegates in connection with board meetings to determine standards of grain, &c	627 03	
"	Expenses in connection with meeting of examiners for the examination of candidates	9 95	
"	Expenses attending examination in Montreal	10 50	
Crain, T. A	Expenses attending Royal Commission, Montreal	433 85	
Wilson, C. A	Services rendered as secretary of Royal Commission, Montreal	341 00	
St. Martin, A	Reporting and transcribing evidence of Royal Commission, Montreal	622 20	
Castle, C. C., Winnipeg	Salary of typewriter from Aug. 30 to Oct. 26 at $60 per month $ 111 50		
" "	Nine months' rent of office at $25 per month 225 00		
" "	Travelling and other expenses as warehouse commissioner 964 46		
		1,300 96	
Horn, D.	Travelling expenses, &c., attending Royal Commission, Montreal	569 40	
Lawlor, W. H.	Freight and express charges on flour samples	29 23	
Parmelee, W. G.	Expenses attending Royal Commission, Montreal	377 25	
Gerald, W. J.	" " "	180 00	
Frankland, H. R.	Express charges	0 30	
Hadrill, George, Secretary Board of Trade, Montreal	Expenses of board meetings to determine standards of grain	506 77	
"	Expenses in connection with the examination of candidates, Montreal	68 97	
Bell, Chas H., Secretary Board of Trade, Winnipeg	Expenses of board meetings to determine standards of grain	1,081 85	
Horn, David	Expenses in connection with grain warehouse	14 75	
		7,834 99	
	Add—Advance to be accounted for by David Horn	7,000 00	
			14,834 99

APPENDIX B—*Continued.*

No. 5.—Details of Sundry Minor Expenditures, 1900–1901—*Continued.*

To whom paid.	Services.	Deductions for Superannuation.	Amounts paid.	Totals.
	Adulteration of Food.	$ cts.	$ cts.	$ cts.
Macfarlane, Thomas	Salary as Chief Analyst for the year	60 00	2,940 00	
McGill, A	" 1st Assistant Analyst for the year	38 00	1,862 00	
Tourchot, A. L. J	" 2nd " " "		1,250 00	
Watson, James	" Clerk in laboratory "		950 00	
Tyrrell, M. J	" " "		600 00	
Wright, S. E	" " "		600 00	
Levêque, H	" Messenger in laboratory "		450 00	
Watson, James	" Food Inspector "		200 00	
Kidd, Thomas	" " "		500 00	
Costigan, J. J	" " "	5 00	245 00	
Ferguson, J. C	" " "	3 00	147 00	
Waugh, R. J	" " "		300 00	
Saucier, X	" " "	4 00	196 00	
Fletcher, R. W	" " "		200 00	
Parkinson, E. B	" " "		200 00	
		110 00		10,640 00
	Contingencies.			
Macfarlane, Thomas	Travelling and other expenses		893 40	
Watson, James	" "		567 01	
Kidd, Thomas	" "		416 95	
Costigan, J. J	" "		424 86	
Ferguson, J. C	" "		168 00	
Waugh, R. J	" "		216 16	
Saucier, X	" "		119 55	
Parkinson, E. B	" "		136 17	
				2,942 10
Bowman, M	Allowance under Act for retaining fees		150 00	
	" " rent		75 00	
	" " material used in analysis		75 00	
	Fees for analysis		721 00	
				1,021 00
Valade, F. X	Allowance under Act for retaining fees		150 00	
	" " rent		75 00	
	" " material used in analysis		75 00	
	Fees for analysis		740 67	
				1,040 67
Ellis, W. H	Allowance under Act for retaining fees		150 00	
	" " rent		75 00	
	" " material used in analysis		75 00	
	Fees for analysis		880 00	
				1,180 00
Fiset, M	Allowance under Act for retaining fees		150 00	
	" " material used in analysis		75 00	
	Fees for analysis		720 00	
				945 00
Kenrick, E. B	Allowance under Act for retaining fees		150 00	
	" " rent		75 00	
	" " material used in analysis		75 00	
	" " cartage		2 50	
	Fees for analysis		560 00	
				862 50
Harrison, F. T	Allowance under Act for retaining fees		150 00	
	" " material used in analysis		75 00	
	Fees for analysis		710 00	
				935 00
Fagan, C. J	Allowance under Act for retaining fees		150 00	
	" " rent		75 00	
	" " material used in analysis		75 00	
	Fees for analysis		487 00	
				787 00

APPENDIX B—*Continued.*

No. 5.—DETAILS of Sundry Minor Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Amounts paid.	Totals.
	ADULTERATION OF FOOD—*Continued.*	$ cts.	$ cts.
	Contingencies—Continued.		
Parkinson, E. B.	Fees for analysis		120 00
Benedict, F. R.	Typewriting list of druggists and grocers, &c.	39 00	
Whitehead, Mrs. J.	Services cleaning instruments, &c., for the year	137 50	
Dominion Express Co.	Express charges	15 80	
Eimer & Amend	Chemicals apparatus and materials for laboratory	238 15	
Watson, Miss A	Folding and addressing circulars, &c	26 40	
Lyman Sons & Co.	Chemical supplied to laboratory	67 23	
Skinner, J. & Co	" "	41 60	
McGill, A	Travelling expenses	11 89	
Girdwood, Dr. G. P.	Attending meeting of Board of Examination of candidates for public analysts	40 00	
Choquette, Rev. C. P.	" "	50 00	
Gooderham & Worts	Spirits for laboratory	32 88	
Muller & Co., London	2 Chapman's essential oil apparatus and case	6 55	
Dessaints, Mrs	Services rendered in June, 27 days at 75c. per day	20 25	
Can. Pacific Ry. Co.	Freight charges	8 16	
DesRosiers, E. R	Chemicals for laboratory	21 30	
O'Reilly & Murphy	Electric work as per contract for laboratory	85 35	
Ehrhardt & Metzger	Apparatus for laboratory	39 07	
Blyth & Watt	Materials, labour and fitting up laboratory	1,245 87	
McNeil & Stewart	2 Andrews chairs	14 00	
Doyle, J. E. & Co.	9,000 crown capsules	27 00	
Ahearn & Soper	1 resistance box and plug	5 75	
Boyden Furniture Co.	Furniture for laboratory	208 60	
Storey, D.	Lumber, materials for laboratory	256 26	
Dunn, Mrs. S	Charwoman in laboratory	19 61	
Leger, E. J	Chemicals for "	147 62	
Johnson, Matthew	Materials supplied to laboratory	180 37	
Butterworth & Co.	" "	49 53	
Turchot, A. L	Travelling expenses to St. Hyacinthe	11 20	
The Ottawa Literary S.S	Printing 500 copies of Mr. McGill illustrated paper on well water	17 51	
Topley, W. J	1 camera and outfit	66 70	
Murphy, J. J	Sundries for St. Hyacinthe laboratory	19 80	
Curry, J. P.	Cartage of laboratory	54 00	
Chandler, Massey	Chemicals apparatus for laboratory	61 78	
Valin, J. A. G.	Services in laboratory, Ottawa	181 98	
Mead, Miss M	" "	99 99	
Davidson, Miss E.	" "	60 00	
Canadian Express Co.	Express charges	49 84	
Dominion Express Co.	"	77 25	
American Express Co.	"	1 20	
Maveity, Mrs. S.	Washing towels	45 00	
Potvin, Amanda	"	19 50	
Payment, T.	Soap, &c	12 00	
Dupont, J. C.	Matches, &c.	8 25	
Storr, A. M.	Cartage	1 50	
St. Cyr, Jean	"	1 00	
Potvin, N.	Sundry petty expenses	3 35	
			3,827 59
			24,300 86
	ADD—Printing	267 86	
	Stationery	240 16	
			508 02
			24,808 88

APPENDIX B—*Continued.*

No. 5.—Details of Sundry Minor Expenditures, 1900-1901—*Concluded.*

To whom paid.	Service.	Totals.
	Adulteration of Food—*Concluded.*	$ cts.
	Contingencies—Concluded.	
	Add—Balances due by Food Inspectors July 1, 1901.. ...	298 30
	Less—Balances due by Food Inspectors June 30, 1901.	25,107 18 225 81
	Total adulteration of food expenditure.....	24,881 37
	Grand total, agreeing with statement No. 12, page 21.....	39,807 73

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

APPENDIX B—*Continued.*

No. 6.—Details of Departmental Expenditures for the Year ended June 30, 1901.

Names.	Rank.	Period.	Deductions for Superannuation.	Amounts paid.	Totals.
			$ cts.	$ cts.	$ cts.
Hon. M. E. Bernier..	Minister.....	For the year....	.....	7,000 00	
Miall, E.....	Commissioner.....	From July 1, '00, to May 31, 1901.	58 63	2,874 63	
Gerald, W. J	Assistant Commissioner and Chief Inspector.....	From Jy 1, '00, to June 5, '01.	60 28	2,953 61	
do	Deputy Minister.....	From June 6, to June 30, 1901.			
Himsworth, W.....	Chief Clerk and Secretary	For the year....	48 00	2,352 00	
Campeau, F. R. E....	Chief Clerk and Chief Acc'tant	"	48 00	2,352 00	
Hall, C. R.....	Assistant Accountant.....	From July 1, '00, to Feb. 28, 1901.	24 00	1,176 00	
Valin, J. E.....	Accountant's Branch Clerk....	For the year ...	36 00	1,764 00	
Carter, W..... ..	Assistant Secretary.	"	36 00	1,764 00	
Shaw, J. F.....	Chief Statistical Clerk, Accountant's Branch....	"	32 00	1,568 00	
Doyon, J. A.... ...	Weight and Measures Clerk, Accountant's Branch.....	"	30 00	1,470 00	
Westman, T.....	Statistical Clerk, Accountant's Branch.....	"	29 00	1,421 00	
Blatch, F. K...	Clerk of Supplies, Secretary's Branch...	From July 1, '00, to Feb. 28, 1901.	18 64	914 64	
Newby, F.....	Secretary's Branch Clerk.....	For the year ...	28 00	1,372 00	
Byrnes, John	Accountant's Branch Clerk....	"	28 00	1,372 00	
Quain, R.....	" "	"	28 00	1,372 00	
Fowler, G.....	Stamp Clerk, Secretary's Br'ch	"	28 00	1,372 00	
Dunne, J. P.....	Accountant's Branch Clerk ...	"	28 00	1,372 00	
Burns, John	Weights and Measures Clerk, Accountant's Branch..	"	28 00	1,372 00	
Winter, C. F.....	Second Class Clerk.....	"	25 00	1,225 00	
Lebel, J. A. W	Secretary's Branch Clerk.....	From July 1, '00, to Jan. 31, 1901.	22 47	619 15	
Hughes, P. A.... ...	Accountant's Branch Clerk....	For the year....	38 50	1,061 50	
Hudon, L. E.....	Statistical Clerk, Accountant's Branch..	"	38 50	1,061 50	
McCullough, A ...	Secretary's Branch Clerk.....	"	16 21	798 00	
Bouchette, R. Errol..	Second Class Clerk.....	From Feb. 1 to June 30, 1901...	16 03	442 35	
do ..	Private Secretary..... .	For the year ...	.....	600 00	
Halliday, W. A.....	Accountant's Branch Clerk....	" ..	26 28	726 12	
Chevrier, Blanche....	Junior Second Class Clerk....	From March 2, to June 30, '01. Retirem. Fund, $9.92	.... ..	188 47	
Potvin, N..	Messenger	For the year....	15 60	504 40	
Yetts, R. P.....	"	"	12 60	407 40	
			799 74		
		Retirement.	9 92		
	Total salaries.	....	809 66	. .....	43,475 77

APPENDIX B—*Continued.*

No. 6.—DETAILS of Departmental Expenditures, 1900–1901—*Continued.*

Names.	Service.	Amounts paid.	Totals.
	Contingencies.	$ cts.	$ cts.
Hagerty, Miss B.	Extra clerk for the year	475 00	
Lawless, Miss E. M.	" "	475 00	
Robillard, G. A	" "	245 06	
Chateauvert, G. E.	" "	447 26	
Chevrier, Miss Blanche	" for Jan. and Feb., 1900.	81 66	
Postmaster	Postage	32 83	
Controller of Stationery	Stationery	1,760 26	
" "	Books	35 30	
" "	Parliamentary publications	180 85	
King's Printer	Printing	1,112 24	
"	Lithographing	66 00	
C. P. Railway Co.'s Telegraph	Telegraph account	187 47	
G. N. W. Telegraph Co	"	137 68	
The Bell Telephone Co	Telephone messages	37 55	
Sproule, W. H. & Co., Ottawa	Repairing clocks, &c	6 25	
McNeill & Stewart, Ottawa	1 (12 drawers) fitting cabinet	24 00	
McNeill, E. R	Rent of 1 Smith-Premier typewriter from Sept. 21 to Dec. 21, 1900 at, $3 per month	9 00	
Miall, E.	Travelling expenses	16 40	
Jones, Yarnell & Poulter, London, Eng.	Subscription	10 71	
Chemical and Electrician	"	4 87	
The Budget, Quebec	"	5 00	
Le Réveil, Montreal	"	9 00	
La Tribune, St. Hyacinthe	"	1 00	
Le Bulletin Mensuel du Travail	"	0 75	
The Canadian Gazette, London, Eng.	"	8 76	
Toronto Daily Star	"	3 75	
Canadian Manufacturer, Toronto	"	1 00	
The Chronicle, Quebec	"	6 00	
The Catholic Record, London	"	2 00	
Scientific American Supplement, N.Y.	"	7 00	
The Winnipeg Daily Tribune	"	4 00	
La Presse, Montreal	"	3 00	
Le Temps, Ottawa	"	3 00	
Mail and Empire, Toronto	"	4 00	
L'Union de St. Hyacinthe	"	2 00	
The Catholic Register, Toronto	"	1 00	
The Witness, Montreal	"	6 00	
The Daily Sun, Belleville	"	5 00	
Le Progrès, Windsor	"	1 00	
The Chatham Banner News	"	4 00	
Canadian Mining Review, Ottawa	"	6 00	
The Gazette	"	12 00	
La Patrie	"	6 00	
The Journal	"	6 50	
Toronto Saturday Night	"	4 00	
Le Soleil, Quebec	"	6 00	
The Daily Telegraph, Quebec	"	4 25	
Acadian Recorder, Halifax	"	10 00	
The Citizen, Ottawa	"	6 00	
Manitoba Free Press, Winnipeg	"	8 00	
The Intelligencer, Belleville	"	12 00	
Daily Times, Hamilton	"	6 00	
The Herald Publishing Co., Montreal	"	6 00	
Daily Morning Chronicle, Halifax	"	5 00	
L'Union des Cantons de l'Est, Arthabaskaville	"	2 00	
The Despatch, Hull, P.Q.	"	3 50	
Le Cultivateur, Montreal	"	1 00	
Globe Printing Co., Toronto	"	8 00	
The Toronto World	"	3 00	

APPENDIX B—*Continued.*

No. 6.—DETAILS of Departmental Expenditures, 1900–1901.—*Concluded.*

Names.	Service.	Amounts paid.	Totals.
	Contingencies—Concluded.	$ cts.	$ cts.
Bryson, Graham & Co	Towels, cloth, etc	60 58	
The New Capital Ice Co	Supplying ice	15 00	
Batterton, T	Packing	30 94	
Storr, A. M	Cartage	86 65	
Maveity, Mrs. S	Washing towels	60 00	
Dupont, J. C	Sundries for department	10 95	
Payment, T	Soap, &c	16 50	
Canadian Express Co	Freight	5 30	
Dominion Express Co	"	2 25	
Skinner, J	Sundries for department	4 50	
Graves Bros	" "	2 80	
Sproule, W. H	Repairing clocks	6 25	
Potvin, N	Sundry petty expenses	20 08	
	Total, Departmental Contingencies		5,859 70
	Authorized disbursements (less superannuation) and retirement		49,335 47
	ADD—Balance due June 30, 1901		16 66
			49,352 13
	LESS—Balance due July 1, 1900		16 66
	Actual disbursements, agreeing with Statement No. 17, page 42		49,335 47

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX B—*Continued.*

No. 7.—Details of Weights and Measures Expenditures for the Year ended June 30, 1901.

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Belleville.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Johnson, W.	Salary as Inspector for year		24 00	3 60	1,172 40	
Slattery, T	" Mechanical Inspector for year		13 96	1 80	684 24	
Irwin, S.	" Asst. Inspector for year		13 96	1 80	684 24	
Behan, J. J.	" " "			1 80	598 20	
Errett, R. W.	" " "			1 80	198 12	
	Salaries		51 92	10 80	3,337 20	
	Contingencies				2,546 24	
						5,883 44
	Hamilton.					
Freed, A. T.	Salary as Inspector for year			3 60	1,596 36	
McDonald, J.	" Asst. Inspector for year		16 04	1 80	782 16	
Marentette, A	" " "		16 04	1 80	782 16	
Fitzgerald, E. W.	" " "			1 80	748 20	
Laidman, R. H.	" " "			1 80	698 16	
Wheatley, A. E.	" " "			1 80	648 12	
Jarvis, H.	" " "			1 80	598 20	
	Salaries		32 08	14 40	5,853 36	
	Contingencies				1,210 30	
						7,063 66
	Ottawa.					
Macdonald, J. A.	Salary as Inspector for year			3 60	1,396 32	
Breen, J.	" Asst. Inspector for year			1 80	598 20	
McFarlane, J.	" " "		7 04	1 80	551 16	
Winsor, J. A.	" " "			1 80	700 93	
Elliott, T. H.	" " "	Insurance. 41 76		1 80	556 44	
	Insurance	41 76				
	Salaries		7 04	10 80	3,803 05	
	Contingencies				1,571 40	
						5,374 45
	Toronto.					
Kelly, D.	Salary as Inspector for year			3 60	1,296 36	
Milligan, R. J.	" Asst. Inspector for year			1 80	798 12	
Wright, R. J.	" " "		16 03	1 80	782 17	
Smith, J. C.	" " "			1 80	598 20	
Murdoch, J.	" " "			1 80	598 20	
	Salaries		16 03	10 80	4,073 05	
	Contingencies				1,789 27	
						5,862 32
	Windsor.					
Hayward, W. J	Salary as Inspector for year		24 00	3 60	1,172 40	
Coughlin, D.	" Mechanical Inspector for year			1 80	798 12	
Thomas, J. S.	" Asst. Inspector for year			1 80	798 12	
Hughes, R. A.	" " "			1 80	648 12	
	Salaries		24 00	9 00	3,416 76	
	Contingencies				1,504 68	
						4,921 44

APPENDIX B—*Continued.*

No. 7.—DETAILS of Weights and Measures Expenditures, 1900-1901—*Con.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Montreal.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Chalus, J. O.	Salary as Inspector for year	.....	31 96	3 60	1,564 44	
Daoust, J. A.	" Asst. Inspector for year	.....	16 04	1 80	782 16	
Gervais, S.	" " "	.....	16 04	1 80	782 16	
Hébert, J. A. P.	" " "	.....	.....	1 80	798 12	
Boudet, E.	" " "	.....	.....	1 80	798 12	
Collins, D.	" Mechanical Inspector for year	.....	.....	1 80	798 12	
Baker, J. S.	" Asst. Inspector for year	.....	.....	1 80	698 16	
Tomlinson, W.M.	" " "	.....	.....	1 80	698 16	
Dessert, V.	" " "	.....	.....	1 80	598 20	
Fournier, L. A.	" " "	.....	.....	1 80	598 20	
	Salaries	.....	64 04	19 80	8,115 84	
	Contingencies	.....	.....	.....	2,008 99	
						10,124 83
	Quebec.					
Guay, G. N.	Salary as Inspector for year	.....	.....	3 60	1,196 40	
		Insurance.				
Kelly, M. J.	" Asst. Inspector for year	38 28	23 96	1 80	735 96	
Guay, A.	" " "	.....	.....	1 80	698 16	
Pinhey, H.	" Mechanical Inspector from July 1, 1900, to May 31, 1901	.....	.....	1 65	548 35	
Chabot, F. X.	" Asst. Inspector for year	.....	12 00	1 80	586 20	
Petit, J. B.	" " "	.....	6 32	1 80	491 88	
Moreau, A.	" Caretaker for year	.....	6 00	.....	294 00	
LeBel, J. A. W.	" Asst. Inspector from Feb. 1 to June 30, 1901	.....	16 05	0 75	441 50	
Préfontaine, F.X.	" Asst. Inspector from April 9 to June 30, 1901	.....	.....	0 30	113 57	
	Insurance	38 28	.....	.....	.....	
	Salaries	.....	64 33	13 50	5,106 02	
	Contingencies	.....	.....	.....	2,095 83	
						7,201 85
	Three Rivers.					
Gravel, A. J.	Salary as Inspector for year	.....	.....	3 60	996 36	
Provost, J. J.	" Asst. Inspector for year	34 96	.....	1 80	663 24	
	Salaries	34 96	.....	5 40	1,659 60	
	Contingencies	.....	.....	.....	449 19	
						2,108 79
	St. John, N.B.					
Wilmot, J. B.	Salary as Inspector for year	.....	24 00	3 60	1,172 40	
Cowan, E.	" Asst. Inspector for year	.....	13 96	1 80	684 24	
Richard, D.	" " "	.....	12 00	1 80	586 20	
Bernier, J. A.	" " from Jan 19 to June 30, 1901	.....	.....	0 75	270 21	
	Salaries	.....	49 96	7 95	2,713 05	
	Contingencies	.....	.....	.....	734 99	
						3,448 04
	Cape Breton.					
Lawrence, G. C.	Salary as Inspector for year	.....	.....	3 60	796 40	
	Contingencies	.....	.....	.....	346 75	
						1,143 15

APPENDIX B—*Continued.*

No. 7.—DETAILS of Weights and Measures Expenditures, 1900–1901—*Con.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total Amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Halifax.	$ cts.	$ cts.	$ cts	$ cts.	$ cts.
Frame, A.	Salary as Inspector for year			3 60	996 36	
Waugh, R. J.	" Asst. Inspector for year			1 80	598 20	
	Salaries			5 40	1,594 56	
	Contingencies				732 44	
						2,327 00
	Pictou.					
Dustan, W. M.	Salary as Inspector for year		19 96	3 60	976 44	
Chisholm, J. J.	" Asst. Inspector for year			1 80	598 20	
	Salaries		19 96	5 40	1,574 64	
	Contingencies				211 15	
						1,785 79
	Charlottetown.					
Davy, E.	Salary as Inspector for year			6 90	893 10	
Hughes, H.	" Asst. Inspector for year			1 80	598 20	
	Salaries			8 70	1,491 30	
	Contingencies				170 91	
						1,662 21
	Winnipeg.					
Magness, R.	Salary as Inspector for year			3 60	1,396 32	
McDonald, A. W	" Asst. Inspector for year			1 80	598 20	
Francis, G. M.	" " "			1 80	598 20	
Girdlestone, R J M	" " "			1 80	194 16	
Ross, H. E.	" " "		4 04	1 80	98 16	
	Salaries		4 04	10 80	2,885 04	
	Contingencies				2,577 87	
						5,462 91
	Calgary.					
Thomas, P.	Salary as Inspector for year			3 60	196 32	
Costello, J. W.	" Asst. Inspector for year		13 96	1 80	684 24	
	Salaries		13 96	5 40	880 56	
	Contingencies				166 74	
						1,047 30
	Victoria.					
Findlay, H	Salary as Inspector for year			3 60	796 32	
McAloney, J. A.	" Asst. Inspector for year			1 80	348 12	
	Salaries			5 40	1,144 44	
	Contingencies				922 20	
						2,066 64
	General.					
Miall, E	Salary as Commissioner of Standards from July 1, 1900, to May 31, 1901		14 63			718 63

APPENDIX B—*Continued.*

No. 7.—Details of Weights and Measures Contingencies, Expenditures, for the Year ended June 30, 1901.

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Burgess, Thos.	Salary as mechanical assistant for the year	800 00	
American Bank Note Co.	Printing weights and measures stamps	330 00	
Dominion Plating Co.	Plating 5 sets of scales	12 50	
Pritchard & Andrews Co.	Letter punches, numerals, steel letters and lead seals	25 08	
Veuve, Louis Havez	25 sets metrical compendiums, 25 sets tables and 100 calculating tables	222 23	
St. Laurent, Alfred	2 doz. ready cleaners	6 00	
Lymans Sons & Co.	30¾ lbs. parafine wax	4 54	
Burrow, Stewart & Milne	Repairing tobacco percentage scales	1 00	
McMorran, R. M.	6 yards green cloth	18 00	
Edwards, W. C. & Co., Ltd	1,000 ft. dressed lumber	20 25	
Canada Atlantic Ry. Co.	Freight	11 69	
Canadian Pacific Ry. Co.	"	0 62	
Dominion Express Co.	Express charges	25 80	
Canadian Express Co.	"	31 55	
Potvin, Napoléon	Petty expenses	0 90	
	Total general contingencies		1,510 16
	Grand total		69,712 61
	ADD—Printing	575 23	
	Stationery	132 69	
			707 92
	Actual disbursements (less superannuation insurance, retirement and guarantee)		70,420 53
	ADD—Balances due to Inspectors July 1, 1900	395 70	
	Old " by " June 30, 1901	193 26	
			588 96
			71,009 49
	LESS—Balances due by Inspectors July 1, 1900	160 00	
	Old " " "	193 26	
			353 26
	Actual disbursements, agreeing with Statement No. 20A, page 48		70,656 23

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 12

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures for the Year ended June 30, 1901.

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Barrie.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Shanacy, M	Salary as Inspector for year		2 00	3 60	94 40	
	Contingencies				0 53	
						94 93
	Belleville.					
Johnson, Wm	Salary as Inspector for year		4 96	3 60	241 44	
McRae, W. D	" Asst. Inspector for year			1 80	98 16	
	Salaries		4 96	5 40	339 60	
	Contingencies				262 86	
						602 46
	Berlin.					
Broadfoot, S	Salary as Inspector from Sept. 1, 1900, to June 30, 1901			3 30	179 99	
	Contingencies				45 28	
						225 27
	Brockville.					
Johnson, C. W	Contingencies					115 46
	Cobourg.					
Bickle, J. W	Salary as Inspector for year		2 00	3 60	94 40	
	Contingencies				75 80	
						170 20
	Cornwall.					
Mulhern, M. M	Salary as Inspector for year		2 00	3 60	94 40	
	Contingencies				42 30	
						136 70
	Guelph.					
Broadfoot, S	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				12 91	
						205 31
	Hamilton.					
McPhie, D	Salary as Inspector for year		36 00	3 60	1,760 40	
McPhie, W. H	" Asst. Inspector from July 3, 1900, to June 30, 1901			1 80	594 97	
Dennis, W. N	" Asst. Inspector for year			1 80	98 16	
	Salaries		36 00	7 20	2,453 53	
	Contingencies				221 37	
						2,674 90
	Kingston.					
Behan, J. J	Salary as Inspector for year			3 60	396 40	
	Contingencies				76 38	
						472 78
	Listowel.					
Male, Thos	Salary as Inspector for year			3 60	96 40	
	Contingencies				80 22	
						176 62

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	London.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Nash, A. F.	Salary as Inspector for year			3 60	996 40	
	Contingencies				624 90	
						1,621 30
	Ottawa.					
Roche, H. G.	Salary as Inspector for year			3 60	996 40	
	Contingencies				913 40	
						1,909 80
	Owen Sound.					
Graham, W. J.	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				126 50	
						318 90
	Peterborough.					
Rudkins, W.	Salary as Inspector from June 26, 1900, to June 30, 1901			3 60	148 48	
	Contingencies				8 00	
						156 48
	Sarnia.					
Hicks, W. H.	Contingencies					21 00
	Stratford.					
Rennie, G.	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				16 00	
						208 40
	Toronto.					
Johnstone, J. K.	Salary as Inspector for year		31 96	3 60	1,564 44	
Pape, J.	" Assistant Inspector for year			1 80	998 16	
	Salaries		31 96	5 40	2,562 60	
	Contingencies				45 25	
						2,607 85
	Montreal.					
Aubin, A.	Salary as Inspector for year			3 60	1,396 32	
O'Flaherty, M. J	" Assistant Inspector for year			1 80	798 12	
	Salaries			5 40	2,194 44	
	Contingencies				821 05	
						3,015 49
	Quebec.					
Le Vasseur, N.	Salary as Inspector for year		19 96	3 60	976 44	
Moreau, A.	" Caretaker "		6 00		294 00	
	Salaries		25 96	3 60	1,270 44	
	Contingencies				153 90	
						1,424 34
	Sherbrooke.					
Simpson, A. F.	Salary as Inspector for year		2 00	3 60		94 40
	St. Hyacinthe.					
Benoit, L. V.	Salary as Inspector from Jan. 8 to June 30, 1901	0 86				35 22

APPENDIX B—*Continued.*

No. 8.—Details of Gas Inspection Expenditures, 1900-1901—*Continued.*

To whom paid.	Service.	Deductions for			Amounts paid.	Total amounts paid.
		Retirement.	Superannuation.	Guarantee.		
	Fredericton.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Fowler, J. D	Salary as Inspector for year			3 60		196 40
	St. John.					
Wilson, J. E	Salary as Inspector for year			3 60	996 40	
	Contingencies				75 90	
						1,072 30
	Halifax.					
Miller, A	Salary as Inspector for year		24 00	3 60	1,172 40	
Ritchie, A. J	" Assistant Inspector for year			1 80	498 12	
Munro, H. D	" "		1 96	1 80	96 24	
	Salaries		25 96	7 20	1,766 76	
	Contingencies				933 19	
						2,699 95
	Charlottetown.					
Bell, J. H	Salary as Inspector from June 17 to June 30, 1901				11 66	
	Contingencies				28 75	
						40 41
	Winnipeg.					
Magness, R	Salary as Inspector for year			3 60	196 40	
	Contingencies				125 52	
						321 92
	Nanaimo, B.C.					
McAloney	Salary as Inspector for year			3 60		96 40
	New Westminster.					
Wolfenden, W	Salary as Inspector for year	5 00		3 60		91 40
	Vancouver.					
Miller, J. E	Salary as Inspector for year		6 00	3 60	290 40	
	Contingencies				112 13	
						402 53
	Victoria.					
Jones, R	Salary as Inspector for year		4 00	3 60	192 40	
	Contingencies				7 55	
						199 95
	General.					
McPhie, D	Contingencies					680 37

APPENDIX B—*Continued.*

No. 8.—Details of Gas General Contingencies, Expenditures for the year ended June 30, 1901—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Wright, Alex. & Co	200 lbs. sperm candles	170 33	
Pritchard & Andrew & Co	Letter punches, numerals, rubber stamps &c	12 40	
Robert Mitchell & Co., The	Repairing gas testing machines and equipment of St. Hyacinthe Gas Office	122 75	
American Meter Co	Two test meters	50 18	
Cleary & Sutherland	Professional services in *re* L. A. King	10 00	
Canadian Rubber Co	Rubber tubing	11 50	
Canadian Pacific Ry. Co.	Freight on candles above	6 90	
	Total General Contingencies		384 06
	Grand Total		22,473 50
	Add—Printing	208 49	
	Stationery	106 72	
			315 21
	Authorized disbursements, less (superannuation retirement and guarantee)		22,788 71
	Add—Balances due by Inspectors June 30, 1901.	212 88	
	" " July 1, 1900.	314 86	
			527 74
			23,316 45
	Less—Balances due by Inspectors July 1, 1900.		244 56
	Actual disbursements agreeing with Statement No. 22, page 54		23,071 89

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

APPENDIX B—*Continued.*

No. 9.—DETAILS of Electric Light Inspection, Expenditures for the year ended June 30, 1901.

To whom paid.	Service.	Amounts Paid.	Totals.
	Belleville.	$ cts.	$ cts.
Johnson, W.	Contingencies		187 08
	Hamilton.		
McPhie, D.	Contingencies		87 65
	London.		
Nash, A. F.	Contingencies		101 00
	Toronto.		
Johnstone, J. K.	Contingencies		149 25
	Montreal.		
Aubin, A.	Contingencies		389 25
	Quebec.		
LeVasseur, N.	Contingencies		63 64
	Sherbrooke.		
Simpson, A. F.	Contingencies		76 59
	St. John.		
Wilson, J. E.	Contingencies		120 34
	Halifax.		
Miller, A.	Contingencies		146 59
	Winnipeg.		
Magness, R.	Contingencies		197 75
	Victoria.		
Jones, R.	Contingencies		17 95
	Chief Electrical Engineer.		
Higman, O.	Salary for year	2,400 00	
	Contingencies	599 47	
			2,999 47

APPENDIX B—*Continued.*

No. 9.—DETAILS of General Electric Light Contingencies, Expenditures for the Year ended June 30, 1901—*Concluded.*

To whom paid.	Service.	Amounts paid.	Totals.
	General Contingencies.	$ cts.	$ cts.
Higman, O., jr.	3 months and 22 days services as electrician, from May 15 to September 8, at $75 per month	282 50	
American Bank Note Co	Electric Light Inspection stamps	791 52	
Ahearn & Soper	One Watt transformer, 100 lamps, two voltmeters, switches, &c.	1,469 46	
Electric Storage Battery Co	Electrical battery	847 69	
Eimer & Amend	300 specimen tubes	47 65	
Weston Electrical Instruments Co	One voltmeter, 1-600 volt multiplier and repairs to voltmeters	137 61	
May, Geo. & Sons	13 leather cases	188 50	
Edison Decorative Co	Repairs to apparatus	16 70	
Butterworth & Co	One Stillion wrench	2 75	
Sproule, W. H. & Co	4 conograph watches	40 00	
Topley, W. J.	Plates, prints, &c.	5 60	
Harris, Campbell & Boyden Co., L't'd	6 birch blocks	3 80	
Blyth & Watt	90 lbs. sheet lead	7 20	
Shedrick, C. E.	Rebuilding 1 Hoyt ammeter and 2 Watt meters and repairs to voltmeter	130 70	
Curbutt, J.	X ray plates	10 24	
Lyman Sons & Co.	5 lbs. sulphurous acid	1 10	
Canadian Pacific Ry. Co	Freight	23 29	
Ottawa Electric Co.	Rent of motor current for the year	125 00	
Warburton & McKinnon	Law costs in *re* Rex *vs.* Electric Co's. in P.E.I.	26 25	
Borbridge, T. & H	Lock on case	0 75	
Dominion Express Co.	Express charges	20 25	
Canadian Express Co.	"	20 70	
	Total general contingencies		4,199 26
	Grand Total		8,735 82
	ADD—Printing	7 35	
	Stationery	16 20	
			23 55
			8,759 37
	ADD—Balances due to inspectors July 1, 1900		348 60
	Actual disbursements agreeing with Statement No. 24, page 56		9,107 97

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department on Salary, during the Year ended June 30, 1901.

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Adams, J. S.		1							
Alexander, Thos		1							
Allen, G. A		1							
Alteman, Peter J		1							
Amor, Wm		1							
Andrews, A. A		1							
Armstrong, Walter		1							
Aubin, A					1	1			
Baby, W. A. D		1							
Baker, J. S				1					
Barber, J. S		1							
Barnes, G		1							
Barrett, J. K		1							
Basinet, Louis		1							
Bayard, Gilbert A		1							
Beauchamp, J. P		1							
Beaulieu, J. B		1							
Behan, J. J				1	1	1			
Bélair, A. (Plessis dit)		1							
Bell, James E		1							
Belleperche, H. J. E		1							
Bellerive, Geo			1						
Belyea, T. H		1							
Bennett, James		1							
Berry, H. L		1							
Bickle, J. W		1			1				
Bish, Philip		1							
Bishop, A		1							
Bishop, J. B		1							
Blackman, C		1							
Blair, A		1							
Blair, J. B		1							
Blethen, C. W		1							
Blyth, Alex		1							
Boomer, J. B		1							
Bouchette, R. E	1								
Boudet, E				1					
Bourassa, Joseph		1							
Bourget, O		1							
Bousquet, J. O		1							
Bouteiller, G. A		1							
Bowman, Allan		1							
Boyd, J. F. S		1							
Boyd, S. I		1							
Boyle, P		1							
Bowen, F. C		1			1	1			
Brabant, J. B. G. N		1							
Brain, A. F		1							
Breen, John				1					
Brennan, D. J		1							
Brennan, John		1							
Broadfoot, S		1			1				
Browne, G. W		1							
Browne, W. J		1							
Bruyère, H. P		1							
Burgess, Thomas H				1					
Burke, T		1							
Burns, John	1								

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1900-1901—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Byrnes, John	1								
Cahill, J. H		1							
Cahill, J. W		1							
Cameron, D. M		1			1				
Campeau, F. R. E	1								
Cargill, W		1							
Carroll, D		1							
Carter, William	1								
Casey, John							1		
Caven, A		1							
Caven, W		1							
Chabot, F. X				1					
Chalus, J. O				1					
Chartier, Etienne		1							
Chisholm, J. J				1					
Chisholm, W. Noble		1							
Clark, A. F		1							
Clark, James Alfred		1							
Clarke, Thomas		1							
Codd, Herbert J. S		1							
Code, Abraham		1						1	
Coleman, Charles		1							
Coleman, J. J		1							
Coles, F. H		1							
Collins, D		1							
Comte, L. A. A. J		1							
Conklin, Ewan		1							
Conway, B. J		1							
Cook, W. R		1							
Costello, J. W				1					
Costigan, H. A		1							
Costigan, J. J		1						1	
Coughlin, D				1					
Coulter, Alex		1							
Courtney, J. J		1							
Cowan, Edgar				1					
Crawford, W. P		1							
Croteau, T. M			1						
Crotty, John		1							
Crowe, W		1							
Daoust, J. A				1					
Daveluy, J. P		1							
David, T		1							
Davis, J		1							
Davis, T. G		1							
Davy, Edward				1	1				
Dawson, W		1							
Deland, A. N		1							
Dennis, W, A					1				
Desaulniers, J. E. A		1							
Desmarais, F		1							
Dessert, Victor				1					
Dibblee, William		1							
Dick, J. W		1							
Dickson, C. T		1							
Dingman, N. J		1							
Dixon, H. G. S		1							
Donaghy, William		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1900–1901—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Doyle, B. J.		1							
Doyon, J. A.	1								
Dudley, W. H.		1							
Dunne, J. P	1								
Dumbrille, J.		1							
Dumbrille, R. W.		1							
Dumouchel, Léandre		1							
Dunlop, C.		1							
Duplessis, C. Z.		1							
Dustan, W. W.				1					
Egan, Wm.		1							
Egener, A		1							
Elliott, T. H.		1		1					
Errett, R. W.				1					
Evans, G. T.		1							
Fahey, Ed.		1							
Falconer, James E.		1							
Falconer, R. H		1							
Ferguson, J.		1						1	
Ferguson, John C.		1							
Finley, Hugh				1					
Fitzgerald, E. W.				1					
Fitzpatrick, W. J.		1							
Fletcher, R. W.		1						1	
Floody, E.							1		
Flynn, D. J.		1							
Forest, E. R.		1							
Fortier, J. J. O.		1							
Fortier, V.		1							
Foster, Henry		1							
Fournier, L. A.				1					
Fowler, George	1								
Fowler, J. D.					1				
Fox, J. D.		1							
Fox, Thomas.		1							
Frame, Archibald.				1					
Francis, G. M.				1					
Fraser, G. J.		1							
Fraser, P.		1							
Freed, A. T.				1					
Gallagher, F.			1						
Geldart, O. A.		1							
George, John		1							
Gerald, C.		1							
Gerald, W. H.		1							
Gerald, W. J	1	1							
Gervais, Samuel				1					
Gill, Wm.		1							
Girard, Irene		1							
Girdlestone, R. J. M.		1		1					
Goodman, A. W.		1							
Gorman, Arthur M.		1							
Gosnell, T. S.		1		1					
Gow, James		1							
Gow, J. E.		1			1				
Graham, A. L.		1							
Graham, W. J.		1							
Graham, W. T.		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1900–1901—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection	Inspection of Staples.
Grant, H. H.		1							
Gravel, A. I.				1					
Grimason, Thomas		1							
Grosbois (de), Chas. B.		1							
Guay, Alphonse.				1					
Guay, G. N.				1					
Hagan, James		1							
Hagarty, P.		1							
Halliday, W. A.	1								
Hanley, A.		1							
Harney, Thomas			1						
Harris, J. G.		1							
Hart, P. D.		1							
Hawkins, A. C.		1							
Hawkins, W. L.		1							
Hayhurst, T. H.		1							
Hayward, W. J.				1					
Hébert, C. D.		1							
Hébert, J. A. P.				1					
Helliwell, H. N.		1							
Henderson, W.		1							
Henwood, Geo.		1							
Hesson, C. A.		1							
Hicks, W. H.		1			1				
Higman, O.						1			
Hill, A. M.		1							
Himsworth, Wm.	1								
Hobbs, G. N.		1							
Howard, W. W. S.		1							
Howden, R.		1							
Howell, Thomas		1							
Howie, A.		1							
Hubley, H. H.		1							
Hudon, L. E.	1								
Hughes, Henry				1					
Hughes, P. A.	1								
Hughes, R. A.				1					
Hurst, Levi B.		1							
Iler, B.		1							
Ironside, G. A.		1							
Irwin, Robert.		1							
Irwin, Samuel				1					
Ives, G. C.		1							
James, T. C.		1							
Jameson, S. B.		1							
Jamieson, R. C.		1							
Jarvis, Henry				1					
Johnson, J. J.		1							
Johnson, Wm.				1	1	1			
Johnston, G. E.		1							
Johnstone, J. K.					1	1			
Jones, Andrew.		1							
Jones, Richard.		1			1	1			
Jubenville, J. P.		1							
Kearny, D. J.		1							
Keeler, G. S.		1							
Keilty, T.		1							
Kelly, Daniel				1					

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1900–1901—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Kelly, M. J.				1					
Kenning, J. H.		1							
Keogh, P. M.		1							
Kidd, Thomas								1	
Kilroy, E. T.		1							
King, R. M.		1							
Knowlson, J. B.		1							
Laidman, Richard H.				1					
Lane, T. M		1							
Laporte, Geo		1							
LaRivière, A. C		1							
LaRue, George		1							
LaRue, J. B. Alexandre		1							
Laurier, J. L.		1							
Lawlor, H		1							
LeBel, J. A. W				1					
Lecours, H. T.		1							
Lee, Edward		1							
LeMoine, Jas. Sir		1							
LeMoine, Jules		1							
Lépine, Louis		1							
LeVasseur, N.					1	1			
Levêque, Hector								1	
Logan, John		1							
Long, W. H. A		1							
Lyons, E.		1							
Macdonald, A. B		1							
Macdonald, J. A				1					
Macfarlane, Thos								1	
Macintyre, D		1							
Magness, Robt				1	1	1			
Mainville, C. P.		1							
Male, Thomas					1				
Malo, T.		1							
Marcon, F. E		1							
Marentette, Alex				1					
Marion, J. E. E		1							
Marshall, F.		1							
Mason, F.		1							
Metcalf, W. F.		1							
Miller, A.					1	1			
Miller, J. E.		1			1	1			
Miller, W. F.		1							
Millier, Elie		1							
Milligan, R. J				1					
Milliken, E		1							
Moore, T.		1							
Moreau, J. Alf.				1	1				
Mulhern, M. M.		1			1				
Munro, H. D.		1			1				
Murdoch, James				1					
Murray, A. S. E.		1							
Murray, David		1							
McAllister, A		1							
McAloney, Joseph A		1		1	1				
McCloskey, J. R.		1							
McCoy, Wm		1							
McCraney, H. P.		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1900–1901—*Continued.*

Names.	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
McCuaig, Aug. F		1							
McCullough, A	1								
McCutcheon, H. M		1							
McDonald, A. W				1					
McDonald, J				1					
McFarlane, C. D		1							
McFarlane, J				1					
McFee, A. C		1							
McGill, A								1	
McLenaghan, N		1							
McPhie, Donald					1	1			
McSween, James		1							
Nash, A. F					1	1			
Nash, S. C		1							
Newby, F	1								
Nichols, J. T		1							
O'Brien, E. C		1							
O'Brien, J. F		1							
O'Donnell, J		1							
O'Donohue, M. J		1							
O'Flaherty, E. J		1							
O'Flaherty, M. J					1				
O'Leary, T. J		1							
Orr, Henry N		1							
Osborne, F. A		1							
O'Sullivan, D		1							
Panneton, G. E		1							
Pape, James					1	1			
Parent, F		1							
Parkinson, Edward B		1							
Parsons, C. H		1							
Patton, James			1						
Pelletier, N. G		1							
Petit, J. B				1					
Poirier, Joseph A		1							
Poirier, J. N		1							
Pole, C. W		1							
Potvin, Napoléon	1								
Powell, J. B		1							
Prosser, Elijah							1		
Provost, J. J				1					
Quain, Redmond	1								
Quinn, J. D		1							
Renaud, A. H		1							
Rennie, George		1			1				
Richard, D				1					
Ridgman, A. H		1							
Rinfret, C. I		1							
Ritchie, A. J					1				
Roche, H. G					1	1			
Ross, H. E		1		1					
Ross, S. F		1							
Rouleau, J		1							
Rousseau, Elzéar H		1							
Rowan, W. E		1							
Roy, George									1
Rudkins, W		1			1	1			
Ryan, Wm		1							
Saucier, X		1						1	
Schram, R. L. H		1							

APPENDIX B—*Continued.*

No. 10.—List of Persons employed by the Inland Revenue Department, 1900 1901—*Concluded.*

Names	Services.								
	Inside.	Excise.	Cullers' Office.	Weights and Measures.	Gas.	Electric Light Inspection.	Preventive.	Food Inspection.	Inspection of Staples.
Scullion, W. J		1							
Shanacy, M		1			1				
Shaw, J. F	1								
Simpson, A. F		1			1	1			
Sinon, E. H		1							
Slattery, R		1							
Slattery, Thomas					1				
Snowdon, J. W		1							
Spence, F. H		1							
Spereman, J. J		1							
Standish, J. G		1							
Stevens, D. B		1							
Stewart, James		1							
St. Michel, F. X		1							
Stratton, W. C		1							
Swannell, F. W		1							
Talbot, John		1							
Taylor, G. W		1							
Thomas, J. S				1					
Thomas, Philip		1					1		
Thomas, Robert		1							
Thorburn, James		1							
Till, T. M		1							
Timmons, P		1							
Tomlinson, W. M				1					
Tompkins, P		1							
Toupin, F. X. J. A		1							
Tourchot, A. L								1	
Tracey, J. P		1							
Tyrrell, M								1	
Valin, J. E	1								
Verner, Francis		1							
Verner, Thomas H		1		1				1	
Villeneuve, J		1							
Wainright, F. G		1							
Waller, J		1							
Walsh, Daniel J		1							
Wardell, R. S. R		1							
Watson, James								1	
Watson, W. W		1							
Waugh, R. J				1				1	
Webbe, C. E. A		1							
Weir, James		1							
Westman, T	1								
Weyms, C		1							
Wheatley, Alfred E				1					
Whelan, W. F			1						
Whitehead, J. P		1							
Wilmot, J. B				1					
Wilson, David		1							
Wilson, J. E					1	1			
Winsor, John A				1					
Winter, C. F	1								
Wolfenden, William		1			1				
Wood, James A		1							
Woodward, G. W		1							
Wright, Robert J				1					
Yetts, R. P	1								
Totals	22	298	6	62	36	18	4	14	1

APPENDIX B—*Continued.*

No. 11.—List of Persons employed by the Inland Revenue Department on salary, during a portion of the Year ended June 30, 1901.

Names.	Period.	Services.				
		Inside.	Excise.	Weights and Measures.	Gas.	Electric Light.
Atherton, R.	From July 1, 1900, to October 31, 1900	....	1	....	....	....
Baby, Jos.	" July 1, 1900, to March 31, 1900	....	1	....	....	....
Bell, J. H.	" June 17, 1901, to June 30, 1901	....	....	....	1	1
Benoit, L. V.	" January 8, 1901, to June 30, 1901	....	1	....	1	....
Bernard, H. J. D.	" May 25, 1901, to June 30, 1901	....	1	....	....	....
Bernier, J. A.	" January 19, 1901, to June 30, 1901	....	....	1	....	....
Bishop, C. A. P. A.	" July 1, 1900, to April 30, 1901	....	1	....	....	....
Blatch, F. K.	" July 1, 1900, to February 28, 1901	1	....	....	....	....
Boivin, C. A.	" July 1, 1900, to March 31, 1901	....	1	....	....	....
Brown, W. J.	" March 25, 1901, to June 30, 1901	....	1	....	....	....
Bulmer, W.	" July 1, 1900, to June 30, 1901	....	1	....	....	....
Burns, R. J.	" January 1, 1901, to June 30, 1901	....	1	....	....	....
Cheseldine, J. H.	" March 25, 1901, to June 30, 1901	....	1	....	....	....
Chevrier, B.	" March 2, 1901, to June 30, 1901	1	....	....	....	....
Coutts, J. J.	" March 25, 1901, to June 30, 1901	....	1	....	....	....
David, D.	" February 19, 1901, to June 30, 1901	....	1	....	....	....
Dodds, E. W.	" July 1, 1900, to October 31, 1900	....	1	....	....	....
Doyle, J. E. H.	" July 1, 1900, to July 13, 1900	....	1	....	....	....
Dumaine, E.	" February 19, 1901, to June 30, 1901	....	1	....	....	....
Earle, R. H.	" July 1, 1900, to March 31, 1901	....	1	....	....	....
Fontaine, A.	" January 1, 1901, to June 30, 1901	....	....	....	....	1
Forest, M.	" January 30, 1901, to June 30, 1901	....	1	....	....	....
Hall, C. R.	" July 1, 1900, to February 28, 1901	1	....	....	....	....
Hall, J. J.	" July 1, 1900, to August 31, 1900	....	1	....	....	....
Harwood, J. O. A.	" May 25, 1901, to June 30, 1901	....	1	....	....	....
Hodder, W. E.	" April 19, 1901, to June 30, 1901	....	1	....	....	....
Lambert, J. A.	" March 5, 1901, to June 30, 1901	....	1	....	....	....
Lawlor, John J.	" March 25, 1901, to June 30, 1901	....	1	....	....	....
Macdonald, D.	" July 1, 1900, to February 28, 1901	....	1	....	....	....
Manning, J.	" July 1, 1900, to February 28, 1901	....	1	....	....	....
Mackay, G. W.	" July 1, 1900, to April 30, 1901	....	1	....	....	....
Maranda, N. A.	" January 15, 1901, to June 30, 1901	....	1	....	....	....
Miall, E.	" July 1, 1900, to May 31, 1901	1	....	1	....	....
Morin, J. P.	" April 1, 1901, to June 30, 1901	....	1	....	....	....
Morton, H. McA.	" January 9, 1901, to April 30, 1901	....	1	....	....	....
McPhie, W. H.	" July 3, 1900, to June 30, 1901	....	....	....	1	....
Noonan, H. T.	" July 3, 1900, to June 30, 1901	....	1	....	....	....
O'Donnell, M. J.	" October 6, 1900, to June 30, 1901	....	1	....	....	....
Patterson, C. E. A.	" May 23, 1901, to June 30, 1901	....	1	....	....	....
Pinbey, H.	" July 1, 1900, to May 31, 1901	....	1	....	....	....
Pinsonneault, A.	" July 1, 1900, to February 28, 1901	....	1	....	....	....
Préfontaine, F. H.	" April 9, 1901, to June 30, 1901	....	....	1	....	....
Ralston, T.	" May 1, 1901, to June 30, 1901	....	1	....	....	....
Robinson, R. S.	" June 12, 1901, to June 30, 1901	....	1	....	....	....
Rork, T.	" January 29, 1901, to June 30, 1901	....	1	....	1	....
Scullion, P. J.	" July 1, 1900, to July 19, 1900	....	1	....	....	....
Simpson, W. A.	" March 25, 1901, to June 30, 1901	....	1	....	....	....
Sloan, W.	" September 1, 1900, to June 30, 1901	....	1	....	....	....
Smyth, B. B.	" July 1, 1900, to July 31, 1900	....	1	....	....	....
Spence, J.	" July 1, 1900, to August 31, 1900	....	1	....	....	....
Thorburn, J.	" February 19, 1901, to June 30, 1901	....	1	....	....	....
Waddington, L. S.	" July 2, 1900, to May 4, 1901	....	1	....	....	....
White, J. B.	" July 28, 1900, to June 30, 1901	....	1	....	....	....
Young, R. E.	" June 13, 1901, to June 30, 1901	....	1	....	....	....
	Totals	4	45	3	4	2

SESSIONAL PAPER No. 12

APPENDIX B—*Concluded.*

List of Persons employed by the Inland Revenue Department on salary, during the Year ended June 30, 1901—*Concluded.*

RECAPITULATION.

Employed during the year	408
" " a portion of the year	54
Total	462

Services.

Employed in the Inside Service	24
" Excise	313
" Culler's Office	6
" Weights and Measures	52
" Gas	7
" Electric Light Inspection	2
" Preventive Service	3
" Food Inspection	7
" Inspection of Staples	1
" Inside and Excise Service	1
" " Weights and Measures	1
" Excise and Preventive	1
" " Weights and Measures and Food Inspection	1
" " Gas	12
" " Food Inspection	5
" Weights and Measures and Gas	2
" " " Food Inspection	1
" Gas and Electric Light	10
" Excise, Gas and Electric Light	5
" " " Weights and Measures	1
" Weights and Measures, Gas and Electric Light	3
" " " and Excise	4
Total corresponding with above	462

W. J. GERALD,
Deputy Minister.

Inland Revenue Department,
Ottawa, August 10, 1901.

INDEX

		Page.
Acadian Recorder	Subscription	145
Acetic Acid	License fees	22-23
"	Quantity taken for consumption	22-23
" Revenue—Comparative Statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28-29
" Warehouse Return		106-107
Adams, J. S.	Salary	120
Adulteration of Food, Expenditure, page 21	Details of	141 to 143
" " "	Fees	20
" " "	Vote for	60
Ahearn, Thomas	Lessee	110
Ahearn & Soper	Contingencies	142, 156
Alain, L	Law costs	128
Alexander, T	Contingencies and salary	117
Allan, S.	Refunds	41
Allen, G. A	Duty-pay	130
"	Salary	121
Allen, S. A	Duty-pay	130
Alteman, P. J.	Salary	117
Ambrose, T. H.	Refunds	34
American Bank Note Co.	Contingencies	120, 140, 150, 156
American Express Co.	Express charges	142
American Meter Co	Contingencies	154
American Tobacco Co	Refunds	35, 36, 37, 38, 39, 40, 41
Amor, William	Salary	117
Amounts voted and expenditure authorized for each service		60
Amyot & Gauvin	Refunds	33, 35
Anderson, J. J.	Commission	129
Anderson, T. E	"	129
Anderton, C.	Refunds	32
Anderton & Co.	"	35
Andrews, A. A	Salary	122
Appendix, A.	Revenue statistics	61
" B.	Details of expenditure	116
Archibald, L. C.	Lessee	112
Arnold, Thomas	Contingencies	133
Atherton, R.	" and salary	124
Aubin, A.	"	155
"	" and salary	152
Audette, L. A.	Law stamps	19
Baby, J.	Salary	122
Baby, W. A. D	Duty-pay	130
"	Salary	117
Bailey, E. R.	Commission	129
Bailey, John	Purchaser	114
Baker, John S	Salary	148
Baldwin, A. H.	Lessee	110
Bank of British Columbia, The	"	110
Barber, J. S.	Salary	120
Barnes, G.	"	125
Barrett, J. K	Contingencies and salary	127
"	Distribution of seizures	139
Barrie Gas Division	Contingencies and salary	151
Barsalo, Edward	Culler's annuity	135
Barton, F.	Refunds	33
Basinet, L.	Contingencies and salary	121
Batterton, Thos	" "	146
Bauer, A	Refunds	31, 34
Bauld, Bros. & Co.	"	37, 40
Bayard, G. A.	Duty-pay	130
"	Salary	121
Beauchamp, J. P.	Contingencies and salary	127
"	Distribution of seizures	137
Beaulieu, J. B.	Salary	123

		Page.
Beauport Brewing Co., Ltd	Refunds	33
Beaupré, Noël	Culler's annuity	134
Bédard, Jérémie	"	134
Behan, J. J.	Salary	147
"	" and contingencies	151
Bélair, A. P.	"	122
Bell, C. H.	Inspection of staples	140
Bell, J. E.	Salary	116
Bell, J. H.	Contingencies and salary	153
Bell Telephone Co.	Rent of telephone and messages	133, 145
Belleperche, A. J. E.	Salary	121
Bellerive, G.	"	133
Belleville Electric Light District	Contingencies	155
" Excise Division	" and salaries	116
" "	Distribution of seizures	136
" Gas District	Contingencies and salaries	151
" Weights and Measures Division	" "	147
Belyea, T. H.	Salary	124
Benedict, F. R.	Contingencies	142
Benjamin, E. R	Bill stamps	19
Bennett, James E. H.	Salary	118
Benoit, L. V.	"	124, 152
Bergeron, Joseph	Culler's expenses	134
"	" fees	132
Berlin Gas Office	Contingencies and salary	151
Bernard, N. J. D	Duty-pay	130
"	Salary	123
Bernard, W.	Refunds	36
Bernhardt, Peter	"	31
Bernier, Hon. M. E	Salary	144
Bernier, J. A.	"	148
Berry, H. L	"	116
Bickle, J. W	Contingencies and salary	151
"	Salary	119
Bill, J. E.	Distribution of seizures	136
Bill Stamps—Distributors' Account		19
Binney, J. W.	Commission	129
Bish, Philip	Duty-pay	130
"	Salary	116
Bishop, A	Salary	126
Bishop, J. B	"	117
Bixel, A. A.	Refunds	31, 34
Blackburn, R., *et al*	Lessees	110
Blackman, C	Salary	117
Blackwood, W.	Refunds	33
Blair, A.	Salary	123
Blair, H. C.	Commission	129
Blair, J. B	Salary	120
Blais, Narcisse	Lessee	110
Blaisdell, N. S	"	110
Blatch, F. K.	Salary	144
Blethen, C. W.	Distribution of seizures	139
"	Salary	125
Blyth, A	"	118
Blyth & Watt	Contingencies	156
Boivin, C. A	" and salary	124
"	Distribution of seizures	139
Bolmer, J. E.	Refunds	30, 31
Bonded Manufactures, Revenue		6, 8
Boomer, J	Purchaser	114
Boomer, J. B	Distribution of seizures	137
"	Salary	120
Booth, J. R	Lessee	110
Borbridge, T. & H.	Contingencies	156
Boswell Bros.	Refunds	33, 35
Bouchette, R. Errol	Salary	144
Boudet, E	"	148
Bouliane, S	Distribution of seizures	118
Bourassa, Joseph	Salary	123
Bourget, O	Distribution of seizures	118
"	Salary	123
Bousquet, J. O	"	124
Bouteiller, G. A	Duty-pay	130
"	Salary	121

		Page.
Boyd, A	Commission	129
Bowen, F. C	Salary	123
Bowen, N. H	Purchaser	114
Bowie, R	Refunds	32
Bowman, Allan	Salary	116
Bowman, M	Food analysis	141
Boyd, J. F. S	Salary	120
Boyd, S. I	"	120
Boyden Furniture Co	Contingencies	142
Boyle, P	Salary	118
Brabant, J. B. G. N	Distribution of seizures	137, 139
"	Salary	122
Brain, A. F	"	116
Brain, Edwin	Refunds	32, 33, 35
Brantford Excise Division	Contingencies and salaries	116
"	Distribution of seizures	136
Breen, J	Salary	147
Brennan, D. J	Duty-pay	130
"	Salary	120
Brennan, John	Duty-pay	130
"	Salary	121
Bridge, Revenue	Lessees	15
Bridgeburg and Black Rock Ferry	"	15
Bristol Ferry	"	15
British American Bank Note Co	Contingencies	128
British Columbia Excise District	" and salary	127
Britton, W. H	Commission	129
Broadfoot, S	Contingencies and salary	151
"	Salary	116
Brockville Gas District	Contingencies	151
Broderick, J. S	Law costs	128
Brodeur, S. A	Commission	129
Bronson & Weston	Lessees	110
Bronson & Weston Lumber Co., The	"	110
Brook, Joseph	Tenant	114
Brown, G. W	Salary	117
Brown, W. J	"	116
Bruyère, H. P	"	122
Bryson, Graham & Co	Contingencies	146
Buckingham and Cumberland Ferry	Lessee	15
Budget, The, Quebec	Subscription	145
Buffalo and Point Abinot Ferry	Lessee	15
Buildings	Revenue	16
Bulletin mensuel du Travail, Le	Subscription	145
Bulmer, W	Salary	122
Burgess, Thomas H	"	150
Burke, T	Contingencies and salary	127
Burns, John	Salary	144
Burns, R. J	"	121
Burrow, Stewart & Milne	Repairs	150
Butterworth & Co	Contingencies	142, 156
Byrnes, John	Salary	144
Cahill, J. H	"	123
Cahill, J. W	Duty-pay	130
"	Salary	121
Calcutt, H	Refunds	32, 35
Calgary Excise Division	Contingencies and salaries	125
" Weights and Measure Division	" "	149
Cameron, A., Mc,K	Commission	129
Cameron, D. M	Distribution of siezures	136
"	Duty-pay	130
"	Salary	117
Cameron, R	Law stamps	19
Campbell, G	Commission	129
Campeau, F. R. E	Salary	144
Canada Atlantic Ry. Co	Freight	150
Canada Lumberman, The	Subscription	133
Canadian Express Co	Freight	128, 142, 146, 150, 156
Canadian Gazette, The, London, Eng	Subscription	145
Canadian Manufacturer, Toronto	"	145
Canadian Mining Review, Ottawa	"	145
Canadian Pacific Railway Co	Freight	142, 150, 154, 156
" "	Lessee	110

		Page.
Canadian Pacific Railway Co	Refunds	31
" Co's Telegraph	Messages	145
Canadian Rubber Co	Contingencies	154
Canadian Twist Tobacco	Quantity taken for consumption	22-23
Cape Breton, Weights and Measures Division	Contingencies and salary	148
Capital Brewing Co., The	Refunds	32
Capital Brewing & Malting Co	"	35
Cargill, W	Salary	126
Carling, T. H	Refunds	31, 34
Carroll, D	Salary	125
Carter, William	"	144
Castle, C. C	Inspection of staples	140
Casual revenue	"	20
Catholic Record, The London, Ont	Subscription	145
Catholic Register, The Toronto	"	145
Cauchy, C	Culler's annuity	134
Caven, A	Contingencies and salary	120
"	Distribution of seizures	137
Caven, W	Duty-pay	130
"	Salary	122
Chabot, F. X	"	148
Chalus, J. O	Contingencies and salary	148
Champness, F	Commission	129
Chandler, Massey	Contingencies	142
Charlottetown Gas District	" and salaries	153
" Weight and Measures Division	" "	149
Chartier, E	Salary	123
Chateauvert, E. G	Extra services	145
Chater, Edwin	Contingencies	128
Chatham Banner News, The	Subscription	145
Chemical & Electrician, London, England	"	145
Chiseldine, J. H	Salary	117
Chevalier, John	Purchaser	114
Chevrier, Miss B	Extra services	145
"	Salary	144
Chief Electrical Engineer	Contingencies and salary	155
Chief Inspector, Excise	" "	127
Chisholm, J. J	Salary	149
Chisholm, W. N	"	118
Choat & Kern	Purchasers	114
Choquette Revd. C. P	Contingencies	142
Chronicle Printing Co., Quebec	Subscription	133
Chronicle, The, Quebec	"	145
Cigarettes—Number taken for consumption		22-23
Cigars—Comparative statement of manufactures for 1899-1900 and 1900-01		90-91
" Licence fees		22-23
" Licenses issued, materials used and number produced		88-89
" Number taken for consumption		22-23
" Returns of manufactures		88-89
" Revenue		6 to 9
" " Comparative monthly statement showing increase or decrease 1899-1900 and 1900-1901		28-29
" Refunds		41
" Warehouse transactions		92
" " " Comparative statement for 1899-1900 and 1900-01		93
Cinq-Mars, A	Distribution of seizures	137
Citizen, The, Ottawa	Subscription	145
Clark, A. F	Salary	120
Clark, James, A	"	124
Clarke, C	Commission	129
Clarke, E. L	Refunds	33
Clarke, L. H	"	31, 32, 34
Clarke T	Salary	118
Cleary and Sutherland	Law costs	154
Cloutier, D	Refunds	32
Cobourg Gas District	Contingencies and salary	151
Cochran, Geo	" "	128
Codd, H. J. S	Salary	122
Code, A	"	125
Coleman, C	"	120
Coleman, J. J	Duty-pay	130
"	Salary	123
Coles, F. H	"	117
Collins, D	"	148

		Page.
Commission on sales of Canada twist stamps	Details of expenditure	129
" " "	Vote for	60
" to customs officers	Detail of expenditure	129
" " "	Vote for	60
Commissioner of standards	Salary	149
Compte, L. A. A. J.	Distribution of seizures	138
"	Salary	122
Conklin, W. M	"	125
Conroy, Mary	Lessee	110
Contingencies—Adulteration of Food		141 to 143
" Cullers		133
" Departmental		145–146
" Electric Light, General		156
" Excise, General		128
" Gas, General		154
" Inspection of Staples		140
" Minor revenues		140
" Weights and Measures, General		150
Controller of Stationery	Books	145
" "	Parliamentary publications	145
" "	Stationery	145
Conway, B. J	Salary	121
Cook, W. R	Distribution of seizures	137
"	Salary	120
Cornwall Excise Division	Contingencies and salaries	116
" "	Distribution of seizures	136
" Gas District	Contingencies and salaries	151
Corporation of Quebec	Lessee	110
" Three Rivers	"	110
Cosgrove, L. J	Refunds	32, 35
Costello, J. W	Salary	149
Costigan, H. A	Contingencies and salary	118
"	Distribution of seizures	136
Costigan, J. J	Salary	122, 141
"	Travelling expenses, &c	141
Coughlin, D	Salary	147
Coulter, A	"	120
Courtney, J. J	Distribution of seizures	
"	Salary	122
Coutlee, L. M	Lessee	110
Coutts, J. J	Salary	117
Cowan, E	"	148
Craig, A. J	Refunds	
Crain, T. A	Inspection of staples	140
Crawford, W. P	Distribution of seizures	136
"	Salary	117
Creely, George	Purchaser	114
Cronmiller & White	Refunds	32
Cross, A. E	"	33, 35
Cross Point and Campbellton Ferry	Lessee	15
Croteau, J. M	Salary	133
Crotty, John	Duty-pay	130
"	Salary	121
Crowe, W	"	121
Culbert, Henry	Refunds	33
Culler's annuities	Details of expenditure	134, 135
" "	Vote for	60
" contingencies	Details of expenditure	133
" "	Vote for	60
" fees	Details of expenditure	132
" "	Vote for	60
" salaries	Details of expenditure	133
" "	Vote for	67
Culling Timber—expenditure, page 18	Details of	133 to 135
" "	Vote for	60
" quantity culled, &c	Quebec	109
" revenue		17
" "	Monthly deposits	24 to 27
Cultivateur, Le, Montreal	Subscription	145
Curbutt, J	Contingencies	156
Curless, C	Distribution of seizures	136
Curren, A. E	Refunds	33, 34, 35
Currier, J. M	Lessee	110
Curry, J. P	Cartage	142

		Page.
Dager, H. J.	Salary	120
Daily Morning Chronicle, Halifax	Subscription	145
Daily Sun, The, Belleville	"	145
Daily Telegraph, The, Quebec	"	145
Daily Times, Hamilton	"	145
Daoust, J. A.	Salary	148
Daveluy, J. P.	"	122, 124
David, T.	"	123
Davidson, Miss E	Services	142
Davis, J.	Salary	118
Davis, T. G.	"	117
Davy, E.	"	149
Dawes, A. J	Refunds	32
Dawson, W.	Duty-pay	130
"	Salary	116
Deland, A. N.	"	123
Demers, F. X.	Culler's annuity	134
Demers, L.	"	134
Dennis, W. N.	Salary	150
Departmental contingencies	Vote for	60
" Expenditure, page 42	Details of	144 to 146
" "	Vote for	60
" Salaries	"	60
Desaulniers, J. E. A.	Duty-pay	130
"	Salary	122
Desjardins, Alfred	Lessee	110
Desmarais, H. F.	Salary	124
Despatch, Hull, The	Subscription	145
DesRosiers, E. R.	Contingencies	142
Dessaints, Mrs.	Extra services	142
Dessert, V.	Salary	148
Devlin, F.	Refunds	32, 35
Dewar, Colin	Lessee	110
Dibblee, William.	Salary	124
Dick, J. W.	"	120
Dick, Walter	Duty-pay	130
Dickson, C. T.	Salary and contingencies	117
Dingman, N. J.	"	127
Distribution of seizures		136 to 139
" recapitulation		139
District Inspectors—Excise	Contingencies and salaries	127
" Gas	" "	151 to 159
" Weights and Measures	" "	147 to 149
Dixon, H. G. S	Salary	122
Dodd, William	Lessee	110
Dodds, E. W	Salary	120
Dominion Express Co	Freight	128, 142, 146, 150, 156
Dominion Phosphate Co., Ltd	Lessee	112
Dominion Plating Co.	Contingencies	150
Donaghy, W.	Salary	117
Dorval, George	Culler's annuity	135
Dorval, Philippe	"	134
Doyle, B. J.	Duty-pay	130
"	Salary	120
Doyle, J. E. & Co	Contingencies	142
Doyle, J. E. H.	Salary	118
Doyon, J. A.	"	144
Dow, W. & Co.	Refunds	32
Drewry, E. L.	"	33
Dudley, W. H.	Salary	120
Duggan, Edward.	Culler's annuity	134
Duggan, James & Co.	Contingencies	133
Dunaine, J. D. E	Salary	124
Dumbrille, James	Contingencies and salary	119
Dumbrille, R. W.	Salary	117
Dumouchel, L.	"	122
Dundas and Waterloo Road—Lessee	Minor expenditure.	15
Dunlop, C.	Distribution of seizures.	137
"	Salary	121
Dunn, Mrs. S.	Services	142
Dunne, J. P.	Salary	144
Dunnville Bridge.	Lessee	15
Duplessis, C. Z.	Salary	124
Dupont, J. C.	Contingencies	142

			Page.
Dustan, W. M.		" and salary	149
Duty-pay to officers		Details of expenditure	130
" "		Vote for	60
" other than special surveys		"	60
Dwyer, P. O		Refunds	35
Dyer, J. J		"	39
Earle, R. H		Salary	118
Eaton, C		Refunds	32, 35
Edison, Decorative		Contingencies	156
Edmundston and Maine Ferry		Lessee	15
Edwards, W. C., & Co		Contingencies	128, 150
Egan, W		Salary	119
Egener, A		Distribution of seizures	137
"		Salary	120
Ehrhardt & Metzger		Contingencies	142
Eimer and Amend		"	128, 141, 156
Ein, S		Refunds	36, 37, 38, 39, 40, 41
Electric Light Inspection—Contingencies		Vote for	60
" "	Expenditure, page 57	Details of	156
" "	Revenue		43
" "	Revenue	Monthly deposits	24 to 27
" "	Stamp Inspection	Districts in account with revenue	56
Electric Railway Co		Contingencies	128
Electric Storage Battery Co		"	156
Elliott, T. H		Salary	120, 147
Ellis, W. H		Food analysis	141
Errett, R. W		Salary	147
Estate of late Robert Reid		Purchaser	114
Evans, G. T		Salary	120
Excise Contingencies		Vote for	60
" Expenditure, pages 10 to 13		Details of	116 to 131
" " on account of stamps		Vote for	60
" General expenditure, pages 12-13		Details of	128 to 131
" Revenue			6 to 9
" " Comparative Statement showing increase or decrease for 1899-1900 and 1900-1901			28-29
" "		Monthly deposits	24 to 27
" " Refunds			30 to 41
" Salaries		Vote for	60
" Statistics			61
Expenditure—Adulteration of food, page 21		Details of	141 to 143
" Culling timber, page 18		"	133 to 135
" Departmental, page 42		"	144 to 146
" Details of (Appendix B)			116 to 162
" Electric light inspection, page 57		Details of	155-156
" Excise, pages 10 to 13		"	116 to 131
" Gas inspection, pages 52 to 56		"	151 to 154
" General statement			4-5
" Inspection of staples, page 21		Details of	140
" Sundry minor, page 21		"	140 to 143
" Weights and measures, pages 47 to 49		"	147 to 149
Fagan, C. J		Food analysis	141
Fahey, Edward		Salary	117
Fairbairn, R. D		Distribution of seizures	136, 137, 139
Falconer, J. E		Duty-pay	130
"		Salary	121
Falconer, R. H		Distribution of seizures	137
"		Salary	120
Farquharson and Grainger		Refunds	32, 35
Ferguson, J		Salary	119
Ferguson, J. C		"	124, 141
"		Travelling and other expenses	141
Ferguson, J. M		Law costs	128
Ferland, E		Commission on sale of tobacco stamps	129
Ferland, P		Culler's annuity	135
Ferries—Revenue			15
Fertilizers		Inspection fees	20
Findley, H		Contingencies and salary	149
Finlayson, Roderick		Lessee	110
Fiset, M		Food analysis	141
Fisher, John		Refunds	31, 34
Fitzgerald, E. W		Salary	147
Fitzgerald, J. & Co		Contingencies	133
Fitzgerald, Martin		"	133

		Page.
Fitzpatrick, W. G.	Distribution of seizures	139
Fitzpatrick, W. J.	Salary	124
Fletcher, R. W.	"	125, 141
Floody, E.	Distribution of seizures	136, 137, 139
Flynn, D. J.	Duty-pay	130
"	Salary	120
Foley, Mary	Services as charwoman	133
Food, adulteration of—Expenditure, page 21	Details of	141 to 143
"	Vote for	60
Forest, E. R.	Salary	122
Forest, M.	"	121
Forest, Z.	Commission on sale of tobacco stamps	129
Fort Erie and Buffalo Ferry	Lessee	15
Fortier, J. J. O.	Contingencies and salary	123
Fortier, J. M.	Refunds	36, 37, 38, 39, 40, 41
Fortier, V.	Salary	122
Foster, Henry	Duty-pay	130
"	Salary	118
Fournier, L. A.	"	148
Fowler, G.	"	144
Fowler, J. D.	"	153
Fox, J. D.	"	122
Fox, Thomas	Distribution of seizures	118
"	Salary	122
Frame, A.	Contingencies and salary	149
Francis, G. M.	Salary	149
Frankland, H. R.	Distribution of seizures	137
"	Inspection of staples	140
"	Salary	120
Fraser, P.	Contingencies and salary	125
Fréchette, L. A.	"	128
Fréderick, Antoine	Culler's expenses	134
"	" fees	132
Fredericton Gas District	Salary	153
Freed, A. T.	Contingencies and salary	147
Frenette, Joseph	Culler's annuity	134
Gallagher, F.	Salary	133
Garbatz, John	Purchaser	114
Gas Co., Quebec	Gas	133
Gas Inspection—Contingencies	Vote for	60
" Expenditure, pages 52 to 55	Details of	151 to 154
" Revenue		43
" "	Monthly deposits	24 to 27
" Salaries	Vote for	60
" Stamps	Distributor's account	50-51
Gass, Charles S.	Lessee	112
Gazette, The, Montreal	Subscription	145
Geldart, O. A.	Salary	124
General Excise—Contingencies		156
General Gas Contingencies		154
General Weights and Measures Contingencies		150
George, John	Salary	119
Gerald, Charles	Duty-pay	130
"	Salary	120
"	Travelling expenses	128
Gerald, W. H.	Distribution of seizures	136
"	Duty-pay	130
"	Salary	119
Gerald, W. J.	Contingencies	127
"	Inspection of staples	140
"	Salary	144
Gervais, S.	"	148
G. E. Tuckett & Son Co. The	Refunds	35, 36, 37, 38, 39, 40, 41
Gilchen, Thomas	Culler's annuity	134
Gilhuly, R. H.	Commission	129
Gill, William	Contingencies and salary	127
Gilpin, R. R.	Commission	129
Girard, I.	Salary	118
Girdlestone, R. J. M.	"	125, 149
Girdwood, Dr. G. P.	Contingencies	142
Globe Printing Co. Toronto	Subscription	145
Gold, T. F.	Refunds	35
Gooderham, W. G.	"	30, 31, 34
Gooderham & Worts	Contingencies	128, 142

		Page.
Goodman, A. W.	Duty-pay	130
"	Salary	118
Gordon, D. W.	Lessee	110
Gorman, A. M.	Salary	125
Gosnell, T. S.	Contingencies and salary	125
"	Distribution of seizures	139
Gouin, Lomer	Law costs	128
Gould Landing and Portage du Fort Ferry	Lessee	15
Gourie & Blackhouse Collieries Ltd. The	"	112
Government Telegraph Lines	Lessee	16
Gow, J.	Contingencies and salary	127
Gow, J. E.	Duty-pay	130
"	Salary	121
Gowen, C. N.	Refunds	34
Graham, A. L.	Salary	120
Graham, W. J.	Contingencies and salary	118, 152
"	Distribution of seizures	136
Graham, W. T.	Salary	120
Grand Trunk Ry. Co	Lessee	112
Grant, H. H.	Contingencies and salary	125
"	Distribution of seizures	139
Grant & Lottridge, B., & Co.	Refunds	31
Gravel, A. I	Contingencies and salary	148
Graves Bros.	"	128, 146
Great Northern Transit Co.	Lessee	110
Great North-western Telegraph Co.	Telegrams	145
Grier, G. A., & Co.	Lessee	110
Grignon, A.	Commission on sale of tobacco stamps	129
Grimason, Thomas	Salary	117
Grosbois, C. B. de	"	123
Guay, A.	"	148
Guay, G. N.	Contingencies and salary	148
Guelph, Excise Division	" "	116-117
" "	Distribution of seizures	136
" Gas District	Contingencies and salary	151
Guérard, L.	" "	133
Hadrill, G.	Inspection of staples	140
Hagan, James	Contingencies	128
Hagarty, Miss B.	Extra services	145
Hagarty, P.	Salary	125
Haldke, E.	Refunds	31
Halifax Electric Light District	Contingencies	155
" Excise Division	" and salaries	125
" "	Distribution of seizures	139
" Gas District	Contingencies and salaries	153
" Weights and Measures Division	" "	149
Hall, C. R.	Salary	144
Hall, J. J.	"	119
Halliday, W. A.	"	144
Halloran, G. F. O.	Law costs	140
Hamilton Electric Light Inspection District	Contingencies	155
" Excise Division	" and salaries	117
" "	Distribution of seizures	136
" Gas District	Contingencies and salaries	151
" Weights and Measures Division	" "	147
Hamilton, J. S., & Co.	Refunds	31
Hanley, A.	Salary	117
Harney, Thomas	Contingencies and salary	133
Harris, J. G.	Salary	119
Harris, Bronson & Co.	Lessees	110
Harris, Campbell & Boyden Co., Ltd.	Contingencies	156
Harrison, F. T.	Food analysis	141
Hart, P. D.	Salary	116
Harwood, J. O. A.	"	123
Havez, Vve. L.	Contingencies	150
Hawkesbury and Grenville Ferry	Lessee	15
Hawkins, A. C.	Salary	122
Hawkins, W. L.	"	125
Hay, M. G.	Commission	129
Hayhurst, T. H.	Salary	117
Hayward, W. J.	Contingencies and salary	147
Hearn, John, estate of	Rent	133
Hébert, C. D.	Contingencies and salary	124
Hébert, J. A. P.	Salary	148

		PAGE.
Heisz, L.	Refunds	35
Helliwell, H. N.	Salary	120
Henderson, W.	"	120
Heney, J. J.	Refunds	30, 31
Henry, J.	"	36, 37, 38, 39, 40, 41
Henwood, G.	Salary	126
Herald Publishing Co., The Montreal	Subscription	145
Hesson, C. A.	Contingencies and salary	119
"	Distribution of seizures	136
Hicks, W. H.	Contingencies	152
"	Salary	117
Higman, O.	Contingencies and salary	155
Higman, O., jun.	Extra services	156
Hill, A. M.	Salary	124
Himsworth, William	"	144
Hinchey, E. H.	"	118
Hiram Walker & Sons, Ltd.	Refunds	30, 31, 32
Hobbs, G. N.	Salary	117
Hobrecker, A.	Refunds	39
Hodder, W. E.	Salary	126
Holden, Daniel	Purchaser	114
Holliday, Thomas	Refunds	31, 34
Holmes, Margaret	Contingencies	133
Horn, David	Inspection of staples	140
Houde, B., & Co.	Refunds	36, 37, 38, 39, 40, 41
Howard, A. L., estate of.	"	30, 41
Howard, G. W.	"	31
Howard, W. W. S.	Duty-pay	130
"	Salary	120
Howden, R.	Distribution of seizures	136
"	" "	119
Howell, Thomas	" "	126
Howie, A.	Duty-pay	130
"	Salary	116
Hubley, H. H.	"	125
Hudon, L. E.	"	144
Hudson, William	Lessee	110
Hueter, W.	Refunds	32, 34
Huether, C. N.	"	31, 33, 34
Huff, G. A.	Lessee	110
Hughes, Henry	Salary	149
Hughes, P. A.	"	144
Hughes, R. A.	"	147
Hull Ferry (new)	Lessee	15
" (old)	"	15
Hurst, Levi B.	Duty-pay	130
"	Salary	120
Hydraulic and other rents.	Appendix "A"	110 to 115
" "	Lessees' account	110 to 115
" "	Monthly deposits	24 to 27
" "	Revenue	14
Iler, B.	Distribution of seizures	137
"	Salary	120
Inland Revenue Department	List of persons employed in	157 to 165
" " Expenditure, page 41.	Details of	144 to 146
Inspection of Staples—Expenditure, page 21	"	140
"	Vote for	60
Inspectors of bonded factories	Contingencies	127
Intelligencer, Belleville	Subscription	145
Irion, A. L.	Refunds	32
Ironside, G. A.	Contingencies and salary	119
Irwin, R.	Salary	117
Irwin, S.	"	147
"	Duty-pay	130
Isaacs, A.	Refunds	36, 37, 38, 39, 40, 41
Ives, G. C.	Salary	125
James, T. C.	"	125
Jameson, S. B.	"	125
Jamieson, R. C.	Duty-pay	130
"	Salary	120
Jarvis, Henry	"	147
Jobin, Jacques	Culler's annuity	134
Johnson, J. J.	Salary	118
Johnson, Mathew	Contingencies	142

		Page.
Johnson, W.	Contingencies	155
"	" and salaries	147, 151
Johnston, C. W.	"	151
Johnston, G. E.	Duty-pay	130
"	Salary	119
Johnstone, J. K.	Contingencies	155
"	" and salary	152
Joliette Excise Division	" and salaries	121
Jones, Andrew	Salary	120
Jones, F. L.	Distribution of seizures	138
Jones, R.	Contingencies	155
"	" and salaries	126, 153
Jones, Yarrell & Poulter, London	Subscription	145
Journal, The Ottawa	"	145
Jubenville, J. P.	Salary	121
Kane, J. R	Contingencies	133
Kearney, D. J.	Distribution of seizures	138
"	Salary	122
Keay, W. S.	Commission	129
Keeler, G. S.	Duty-pay	130
"	Salary	119
Keeler, W. H.	Distribution of seizures	136
Keilty, Thomas	Salary	119
Kelly, D	"	147
Kelly, Edward	Culler's expenses	133, 134
"	" fees	132
Kelly, G.	Refunds	36
Kelly, M. J.	Salary	148
Kelly & Omand	Refunds	33
Kenning, J. H.	Contingencies and salary	121
Kenrick, E. B.	Food analysis	141
Keogh, P. M.	Duty-pay	130
"	Salary	121
Kidd, Thomas	"	141
"	Travelling expenses	141
Kilroy, E. F.	Duty-pay	130
"	Salary	116
King, R. M	"	125
King's Printer	Printing	145
Kingston Excise Division	Contingencies and salaries	117
" "	Distribution of seizures	136
" Gas District	Contingencies and salary	151
Knowlson, J. B.	Salary	119
Kuntz, Jacob	Refunds	32, 35
Labatt, G. T.	"	35
Labatt, John	"	31, 32, 34, 35
Laflamme, Joseph	Culler's annuity	134
Laidman, R. H	Salary	147
Lambert, E. A.	Distribution of seizures	138
Lambert, J. A.	Salary	122
Land sales	Details	114–115
"	General account of	14
Lane, T. M	Salary	122
Lapasse and Gower Point Ferry	Lessee	15
La Patrie, Montreal	Subscription	145
Laporte, G.	Salary	118, 122
La Presse, Montreal	Subscription	145
LaRivière, A. C.	Salary	125
LaRue, G.	Contingencies and salary	123
"	Distribution of seizures	138
LaRue, J. B. A.	Salary	123
LaSalle, B.	Bill stamps	19
Latchford, T. R.	Refunds	41
La Tribune, St. Hyacinthe	Subscription	145
Laurentides Pulp Co., Ltd	Lessee	112
Laurier, J. L.	Salary	122
Laverdure, E. G.	Lessee	110
Law costs	Expenditure	128
Lawless, Miss E. M	Extra services	145
Lawlor, H.	Contingencies and salary	121
"	Distribution of seizures	137, 138
"	Inspection of staples (contingencies)	140
Lawlor, J. J	Salary	117
Lawrence, George C	"	148

		PAGE.
Law stamps	Distributor's account	19
" Revenue		43
LeBel, J. A. W	Salary	144, 148
Le Bulletin Mensuel du Travail	Subscription	145
Lecours, H. T.	Salary	121
Le Cultivateur, Montreal	Subscription	145
Leduc, J. D.	Law costs	128
Lee, Edward	Salary	118
Léger, E. J.	Contingencies	142
Lemesurier, J.	Refunds	35, 37, 38, 39
LeMoine, J.	Salary	123
Lépine, L.	Distribution of seizures	138
"	Duty-pay	130
"	Salary	123
Le Progrès, Windsor	Subscription	145
Le Réveil, Montreal	"	145
Le Soleil, Quebec	"	145
Letellier, Blaise	Law costs	128
Le Temps, Ottawa	Subscription	145
Le Vasseur, N.	Contingencies	155
"	" and salary	152
Levêque, H	Salary	141
List of persons employed by Inland Revenue Department		157 to 165
Listowel Gas District	Contingencies and salary	151
Logan, J.	Salary	117
London Electric Light District	Contingencies	155
" Excise Division	" and salaries	117-118
" Gas District	" and salary	152
Long, W. H.	Salary	125
Luke, C	Refunds	31, 34
L'Union de St. Hyacinthe	Subscription	145
L'Union des Cantons de l'Est	"	145
Lutz, W. H	Refunds	31, 34
Lyman & Perkins	Lessee	110
Lyman Sons & Co	Contingencies	128, 142, 150, 156
Lynch, John B.	Culler's annuity	134
Lyons, Edward	Salary	117
Macdonald, A. B.	"	119
"	Duty-pay	130
Macdonald, D.	Salary	121
Macdonald, J. A.	Contingencies and salary	147
Macfarlane, Thomas	"	141
"	Salary	141
"	Travelling expenses	141
Macintyre, D	Salary	122
Magness, Robert	Contingencies	155
"	" and salaries	149, 153
Mail and Empire, Toronto	Subscription	145
Mainville, C. P	Salary	122
Male, Thomas	Contingencies and salary	151
Malo, T.	Duty-pay	130
"	Salary	122
Malone, J. C.	Culler's annuity	134
Malone, Thomas	"	134
Malt—Comparative Statement for 1899-1900 and 1900-1901		73
" License fees		22-23
" Licenses issued, grain issued, quantity produced		72
" Quantity taken for consumption		22-23
" Revenue		6 to 9
" " Comparative Statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28-29
" " Refunds		31 to 35
" " Warehouse returns		74-75
" " " Comparative Statement showing increase or decrease for 1899-1900 and 1900-1901		76-77
" Liquor, Comparative Statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28-29
" " License fees		22-23
" " Licenses issued, materials used and quantity produced		78
" " Quantity taken for consumption		22-23
" " Revenue		6 to 9
" " " Comparative Statement of malt liquor manufactured for the years ended 1899-1900 and 1900-1901		79
Manitoba Excise District	Contingencies and salary	127

		Page.
Manitoba Free Press	Subscription	145
Manning, J	Salary	122
Manuf. in Bond.—Comparative Statement for 1899-1900 and 1900-1901		98–99
" License fees		22–23
" Licenses issued, materials used and quantity produced		96–97
" Quantity taken for consumption		22–23
" Revenue		6 to 9
" " Comparative Statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28–29
" " refunds		41
" " warehouse returns		100–101
" " " Comparative Statement showing increase or decrease for 1899-1900 and 1900-1901		102–103
" Transactions in vinegar		104
Maranda, N. A	Salary	123
Marcon, F. E	Duty-pay	130
"	Salary	121
Marentette, A	"	147
Marion, J. E. E	"	121
Marshall, F	"	119
Martini, Joseph	Refunds	32, 35
Mason, F	Duty-pay	130
"	Salary	118
Mauray, Jonathan	Lessee	110
Maveitty, Mrs. S	Contingencies	142, 146
May, G. & Sons	"	156
May, John P	Refunds	33, 34, 35
Mead, Miss M	Services	142
Metcalf, W. H	Salary	120
Methylated Spirits—Refunds		41
" Statement showing expenditure, page 58-59. Vote for		60
" " net receipts		58–59
" " quantity of raw material on hand at beginning and end of year, brought in and used during year 1900-1901		108
" " quantity of raw material used and quantity produced therefrom		108
" " quantity of methylated spirits on hand at beginning and end of year, brought in and sold and otherwise accounted for during the year 1900-1901		108
" " transactions in connection with manufacture of.		58–59
Metric System supplies	Vote for	60
Meyer, F. E	Commission	129
Miall, E	Salary	144, 149
"	Travelling expenses	145
Miller, A	Contingencies	155
"	" and salary	153
Miller, J. E	" and salaries	126, 153
Miller, W. F	" and salary	117
"	Distribution of seizures	136
Millier, E	Duty-pay	130
"	Salary	122
Milligan, R. J	"	147
Milliken, E	"	119
Minister of Inland Revenue	"	144
" "	" vote for	60
Minor Expenditure, page 21	Details of	140 to 143
" "	Vote for	60
Minor Public Works	Revenue	15–16
" Revenue	Monthly receipts	24 to 27
" "	Vote for	60
Montebello and Alfred Ferry	Lessee	15
Montreal Electric Light Inspection District	Contingencies	155
" Excise Division	" and salaries	121 to 123
" "	Distribution of seizures	137–138
" Gas District	Contingencies and salaries	152
" Weights and Measures	" "	148
Moore, T	Salary	125
Moreau, A	Duty-pay	130
"	Salary	121
Moreau, E. P	Refunds	41
Moreau, J. A	Salaries	148–152
Morency, D	Culler's annuity	135

		Page.
Morin, J. P	Salary	124
Morisette, Joseph	Culler's annuity	134
Morton, H. McA	Salary	121
Mulhern, M. M	Contingencies and salaries	116, 151
Muller, Jas	Refunds	31
Muller & Co	Contingencies	142
Mulrooney, W. J. & G	"	133
Mulvena, H. W	Law costs	128
Munro, H. D	Salaries	125, 153
Murdoch, J	Salary	147
Murphy, J. J	Contingencies	142
Murphy, M	Purchaser	114
Murphy, T	Culler's annuity	134
Murray, A. S. E	Salary	120
Murray, D	Duty-pay	130
"	Salary	123, 124
McAdam, Thomas	Purchaser	114
McAllister, A	Contingencies and salary	116
"	Distribution of seizures	136
McAloney, J. A	Salaries	126, 149, 153
McCarthy, D. J	Refunds	32-34
McCloskey, J. A	Salary	124
McCormick, John	Culler's annuity	135
McCormick, Man Co., Ltd., The	Refunds	41
McCoy, William	Duty-pay	130
"	Salary	116
McCraney, H. P	"	126
McCuaig, A. F	"	116
McCullough, A	"	144
McCutcheon, H	"	126
McDonald, A. J	"	125
McDonald, A. W	"	149
McDonald, John	"	147
McDonald, J. Fred	Commission	129
McDonald, R. D	Refunds	39
McDonald, Rt. Rev. Bishop	Lessee	112
McDonald, Sir W. C	Refunds	35, 36, 38, 39, 40
McFarland, C. D	Salary	117
McFarlane, J	"	147
McFee, A. C	Duty-pay	130
"	Salary	116
McGill, A	"	141
"	Travelling expenses	142
McGuire, T	Salary	118
McInenly, T	Culler's annuity	134
McIntyre, Rt. Rev. Bishop	Lessee	110
McKay, G. W	Salary	117
McKay Milling Co. (Ltd)	Lessee	110
McKendry, Daniel	Culler's expenses	134
"	" fees	132
McKenna, A	Refunds	36, 37, 38, 39, 40, 41
McKenna Bros	"	36, 37, 38, 39, 41
McLenaghan, N	Contingencies and salary	118
McLeod, Col. J. F	Bill stamps account	19
McMorran, R. M	Contingencies	150
McNaughton, John	Culler's annuity	134
McNee, Archie	Lessee	110
McNeill, E. R	Contingencies	145
McNeill & Stewart	"	142, 145
McNivern, J. D	Salary	125
McPeak, William	Culler's expenses	134
"	" fees	132
McPherson, J	Commission	129
McPhie, D	Contingencies	153, 155
"	" and salary	151
McPhie, W. H	Salary	151
McRae, W. D	"	151
McSween, James	"	117
Nanaimo Gas District	"	153
Napanee Gas District	"	153
Nash, A. F	Contingencies	155
"	" and salary	152
Nash, S. C	" "	125
Nelson, C. H	Refunds	39

		Page.
New Brunswick Excise District	Contingencies and salary	127
Newby, F.	Salary	144
Newmeyer, Jas.	Refunds	33
New Westminster Gas District	Salary	153
Niagara and Youngston Ferry	Lessees	15
Nichols, J. T.	Salary	118
Nicholson, D.	Refunds	35, 39, 40
Nolan, J. C.	Purchaser	114
Nolan, J. F.	Refunds	35
Noonan, H. T.	Salary	118
Nutter, C. S.	Refunds	33
O'Brien, E. C.	Salary	116
O'Brien, J. F.	"	117
O'Brien, Martin O.	Culler's expenses	134
"	" fees	132
O'Donnell, J.	Salary	117
O'Donnell, J. M.	"	122
O'Donoghue, M. J.	"	116
O'Dwyer, Patrick O.	Refunds	31
Oertling, L.	Contingencies	128
O'Flaherty, E. J.	Salary	122
O'Flaherty, M. J.	"	152
O'Keefe, Eugene	Refunds	32, 35
Oland, J. C.	"	33, 35
O'Leary, T. J.	Duty pay	130
"	Salary	120
O'Meara, F. M.	"	
Ontario Excise Districts	Contingencies and salaries	127
O'Reilly & Murphy	"	142
Orillia Brewing Co.	Refunds	32, 35
Orr, H. N.	Salary	116
Osborne, F. A.	"	125
Oshmer, R.	Refunds	33
O'Sullivan, D.	Salary	126
Other receipts—Revenue—Comparative statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28-29
" " from		7, 9
" " monthly deposits		24 to 27
" " refunds		41
Ottawa and Kettle Island Ferry	Lessee	15
" Electric Co	Contingencies	156
" "	Lessee	110
" Electric Railway Co.	"	110
" Excise Division	Contingencies and salaries	118
" "	Distribution of seizures.	136
" Gas District.	Contingencies and salary	152
" Investment Co.	Lessee	110
" Weights and Measures Division.	Contingencies and salaries	147
Ottterbein, C.	Refunds.	31, 34
Ouellette Street Ferry, Detroit	Lessee	15
Owen Sound Excise Division	Contingencies and salaries	118
" "	Distribution of seizures.	136
" Gas District.	Contingencies and salary	152
Panneton, G. E.	Salary	122
Pape, James	"	152
Papineauville and Brown's wharf	Lessee	15
Paquet, J. T.	Distribution of seizures.	139
Park, W. A.	Commission	129
Parkinson, E. B.	Contingencies	142
"	Salaries	126, 141
"	Travelling expenses	141
Parmelee, W. G.	Inspection of staples	140
Parson, C. H.	Salary	126
Part of building, Portland, N.B.		16
Patrie, La, Montreal	Subscription	145
Patry, Thomas.	Cullers' annuity	134
Patterson, C. E. A.	Salary	123
Patton, James	"	133
Payment, T.	Contingencies	142, 146
Peel, A.	Lessee	110
Pelletier, N. G.	Distribution of seizures	138
"	Salary	123
Pembroke and Allumette Island Ferry (new lease)	Lessee	15
" " " (old lease).	"	15

		Page.
Perkins, Lyman	Lessee	110
Perley and Pattee	"	110
Persons employed by Inland Revenue Dept.	List of	157 to 165
Perth Excise Division	Contingencies and salaries	118, 119
Peterborough Excise Division	" "	119
" "	Distribution of seizures	136
" Gas District	Contingencies and salary	152
Petit, J. B.	Salary	148
Petrie, J. & J.	Lessees	110
Petroleum	Number of packages inspected	95
" Inspection Fees		22, 23
" " Comparative statement for 1899-1900 and 1900-1901		95
" Return of Canadian petroleum and naphtha		94
" Revenue—Comparative statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28, 29
Pictou Excise Division	Contingencies and salaries	125
" Weights and Measures Division	" "	149
Pinhey, Henry	Salary	148
Pinsonnault, A. C.	"	122
Plamondon, J. D.	Law costs	128
Plamondon, M. A.	Culler's dues	17
Poirier, J. N.	Contingencies and salary	124
Pole, C. W.	Salary	116
Port Arthur Excise Division	Contingencies and salaries	119
Postmaster, Ottawa	Postage for the year	145
Post Office Department	Bill stamps account	19
Post Office, Quebec	Rent	133
Potvin, Amanda	Contingencies	142
Potvin, Nap.	"	128, 142, 146, 150
"	Salary	144
Pouliot, J. C.	Law cost	128
Powell, Alex.	Purchaser	114
Powell, J. B.	Contingencies and salary	116
"	Distribution of seizures	136
Powers, R.	Culler's annuity	135
Préfontaine, F. X.	Salary	148
Prescott, Excise Division	Contingencies and salaries	119
" "	Distribution of seizures	136
" and Ogdensburg Ferry	Lessee	15
Presse, La, Montreal	Subscription	145
Preventive Service	Contingencies and salaries	131
"	Vote for	60
Pritchard Andrews Co., The	Contingencies	128, 150, 154
Progrès, Le, Windsor	Subscription	145
Proteau & Carignan	Refunds	33
Provost, J. J.	Salary	148
Quain, Redmond	"	144
Quebec Culler's Office	Annuities	134, 135
" "	Contingencies and salaries	132, 133
" "	Expenses	134
" "	Fees	132
" "	Revenue	17
" Electric Light Inspection Districts	Contingencies	155
" Excise Districts	" and salaries	127
" " Division	" "	123
" " "	Distribution of seizures	138
" Gas Co.	Contingencies	133
" Gas District	" and salaries	152
" Harbour Commissioners	Lessees	110
" Weights and Measures Divison	Contingencies and salaries	148
" Post Office	Contingencies	133
Quenston Ferry	Lessee	15
" and Lewiston Ferry	"	15
Quinn, J. D.	Duty-pay	130
"	Salary	123
Quyon Ferry	Lessee	15
Ralston, T.	Duty-pay	130
Ramon, P.	Salary	121
Rancour, N.	Contingencies	133
Rankin, John	Lessee	110
Ratchford, C. E.	Commission	129
Rau, Mary	Refunds	31, 34
Raw leaf tobacco taken for consumption		22, 23
Ready, James	Refunds	33

		PAGE.
Refunds		30 to 41
Registrar, Exchequer Court	Contingencies	128
Reid, John	Lessee	110
Reid, Robert (Estate of)	Purchaser	114
Reinhardt, C. S	Refunds	33
Reinhardt, L	"	32, 35
Renaud, A. H	Salary	122
Rennie, G	Contingencies and salary	152
"	Salary	120
Réveil, Le, Montreal	Subscription	145
Revenue, Casual		20
" Culling timber		17
" Electric light inspection		56
" Excise		6 to 9
" Gas inspection		50–51
" General		3
" Hydraulic and other		14
" Law stamps		43
" Methylated spirits		58–59
" Minor Public Works		15–16
" Monthly deposits		24 to 27
" Sundry minor revenue		20
" Weights and Measures		44–46
Richard, D	Salary	148
Richelieu and Ontario Navigation Co	Lessee	110
Ridgman, A. H	Salary	126
Riley, H. T	Refunds	35
Rinfret, C. T	Contingencies and salary	127
"	General excise contingencies	128
Ritchie, A. J	Salary	153
Ritchie, W	Lessee	110
Ritchie, W. B. A	Professional services	128
Robert Mitchell Co., The	Contingencies	154
Robertson, David, and Rowland, J	Lessees	110
Robillard, G. A	Extra services	145
Robinson, R. S	Salary	119
Robitaille, Cyrille	Lessee	112
Roche, H. G	Contingencies and salary	152
Rochester, John	Lessee	110
Rockliffe and Gatineau Point Ferry	"	15
Roger, G. M	Law costs	128
Rork, T	Salary	119
Rose, G. C	Commission	129
Ross, H. E	Salaries	125, 149
Ross, S. F	"	117
Ross, W	Refunds	32, 35
Ross, W. J	Commission	
Rouleau, J	Salary	123
Rousseau, E. H	"	123
Rowan, W. E	Contingencies	118
Roy, George	" and salary	140
Roy, J. A	Refunds	31, 34
Roy, Joseph	Commission on sale of tobacco stamps	129
Rudkins, W	Contingencies and salaries	119, 152
Rudolp, Henry	Refunds	31, 35
Ryan, William	Distribution of seizures	137
"	Salary	122
Sarnia Gas District	Contingencies	152
Saucier, X	Salary	125, 141
"	Travelling expenses	141
Sault St. Marie Ferry	Lessee	15
School Trustees, Rondeau Harbour	Lessees	110
Schram, R. L	Distribution of seizures	136
"	Salary	119
Schwan, David	Refunds	32
Schwan, W	"	32, 35
Schwartz, John S	"	32
Schwartz, W	"	33
Scientific American and Supplement, N. Y	Subscription	145
Scullion, P. J	Salary	122
Scullion, W. J	Duty-pay	130
"	Salary	122
Seagram, Jos. E	Refunds	31, 34
Seizures—Distribution of	"	136 to 139

		PAGE.
Seizures—Excise—Comparative Statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28–29
" " Recapitulation		139
" " Revenue		6 to 9
" Refunds		41
" Revenue	Monthly deposits	24 to 27
Shanacy, M	Contingencies and salaries	151
"	Salary	120
Shaw, J. F	"	144
Shea, Patrick	Refunds	33
Shedrick, C. E	Contingencies	156
Sherbrooke Electric Light District	"	155
" Excise Division	" and salaries	123
" "	Distribution of seizures	139
" Gas District	Salary	152
Sheriff, District of Montreal	Contingencies	128
Sherman, G	Refunds	31
Simard, A. H	Law costs	128
Simpson, A. F	Contingencies	155
"	" and salary	123
"	Distribution of seizures	139
"	Salary	152
Simpson, T. W	Refunds	32, 35
Simpson, W. A	Salary	120
Sinon, E. H	"	116
Skead, late Hon. James (Estate of)	Lessee	110
Skelly, Sophia M	Refunds	41
Skinner, J	Contingencies	146
Skinner, J., & Co	"	142
Slattery, Ralph	Salary	118
Slattery, Thomas	"	147
Sleeman, Geo	Refunds	33, 34
Sloan, Wm	Salary	116
Smith, A. H	Commission	129
Smith, J	Refunds	35
Smith, J. C	Salary	147
Smith, L. M	Refunds	36, 37, 40
Smyth, B. B	Salary	124
Snowden, J. W	"	122
Snuff—Quantity taken for consumption		22–23
Soleil, Le, Quebec	Subscription	145
Sorel—Excise Division	Contingencies and salary	123
Sparling, J. W	Salary	125
Spence, F. H	"	116
Spence, John	Contingencies and salary	116
Spereman, J. J	Salary	117
Spirits—Distilleries, transactions		66–67
" License fees		22–23
" Licenses issued, materials used and quantities produced		62–63
" " " " Comparative Statement for 1899-1900 and 1900-1901		64–65
" Quantity taken for consumption		22–23
" Revenue		6 to 9
" " Comparative Statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28–29
" " Refunds		30–31
" " Warehouse Returns		68–69
" " " Comparative Statement for 1899-1900 and 1900-1901		70–71
Spratt, Joseph	Lessee	110
Sproule, W. H., & Co	Contingencies	145, 146, 156
Stamps—Bill—Distributors' account		19
" Electric Light Distributors' account		56
" " Revenue		43
" Gas Distributors' account		50–51
" " Revenue		43
" Law Distributors' account		19, 51
" Revenue		43
" Weights and Measures		43
Standish, G. J	Duty-pay	130
"	Salary	116
Stanley, T. D	Commission	129
Stevens, D. B	Salary	126
Stewart, James	"	118
Storr, A. M	Contingencies	146

		PAGE.
Stratford Excise Division	" and salaries	120
" "	Distribution of seizures	136-137
" Gas District	Contingencies and salary	152
Stratton, W. C	" "	127
Steel, J. J	Refunds	31
Stevens, D. B	Salary	126
Stevenson, Thomas	Refunds	31, 34
Storey, D	Contingencies	142
Storr A. M	Cartage	142
Street, A. F	Commission	129
Sullivan, Timothy	Purchaser	114
Swannell, F. W	Salary	126
Swift, E. G	Refunds	30, 31
St. Catharines Excise Division	Contingencies and salaries	119-120
" "	Distribution of seizures	136
St. Cyr, Jean	Cartage,	142
St. Hyacinthe Excise Division	Contingencies and salaries	124
" "	Distribution of seizures	139
" Gas District	Salary	152
St. John (N.B.) Electric Light Inspection District	Contingencies and salary	155
" Excise Division	" "	124
" "	Distribution of seizures	139
" Gas district	Contingencies and salaries	153
" Weight and Measure Division	" "	148
St. Johns (P.Q.)	Distribution of seizures	139
St. Laurent, Alfred	Contingencies	150
St. Leonard and Van Buren Ferry	Lessee	15
St. Martin, A	Contingencies	140
St. Michel, F. X	Salary	122
Talbot, J,	Law costs	118
Tansey, J. P. F	Distribution of seizures	137
Taschereau, L. A	Law costs	128
Taylor, G. W	Duty-pay	130
"	Salary	121
Taylor, H. J	Refunds	32
Temps Le, Ottawa	Subscription	145
Tennant, J. F	Commission	129
Tétreau, Nérée	Lessee	110
Tétreault, J	Salary	124
The Analyst, London, England	Subscription	145
The Ottawa Literary S. S	Contingencies	142
The Bell Telephone Co	Messages and rent	133, 145
The Bronson & Weston Lumber Co	Lessee	110
The Budget, Quebec	Subscription	145
The Canadian Gazette, London, Eng	"	145
The Catholic Record, London	"	145
The Catholic Register, Toronto	"	145
The Chatham Banner	"	145
The Chronicle, Quebec	"	145
The Citizen, Ottawa	"	145
The Daily Sun	"	145
The Daily Telegraph, Quebec	"	145
The Despatch, Hull, P.Q	"	145
The Electrical World, N.Y	"	145
The Frontenac Milling Co., Ltd	Lessees	110
The Gazette, Montreal	Subscription	145
The G. E. Tucket & Son Co	Refunds	35, 36, 37, 38, 39, 41
The Gourie & Black House Collieries, Ltd	Lessee	112
The Herald Publishing Co., Montreal	Subscription	145
The Intelligencer, Belleville	"	145
The Journal, Ottawa	"	145
The McCormac-Man Co., Ltd	Refunds	41
The Ottawa Literary S. S	Contingencies	142
The Toronto World	Subscription	145
The Winnipeg Daily Tribune	"	145
The Witness, Montreal	"	145
Thomas, J. S	Salary	147
Thomas, P	Contingencies and salary	125, 149
Thomas, R. T	Duty-pay	130
"	Salary	121
Thomas, W. J	Refunds	32, 35
Thompson, Abraham	Purchaser	114
Thompson & Perkins	Lessees	110
Thorburn, Jas	Salary	126

		Page.
Three Rivers Excise Division	Contingencies and salaries	124
" Weights and Measures Division	" "	148
Till, T. M.	Salary	116
Timmons, P.	"	123
Tobacco, Canadian Twist	Commission on sale of stamps	129
" "	Comparative statement for 1899-1900 1900 and 1901	87
" "	Quantity taken for consumption	22-23
" "	Statement of the revenue collected for year 1900-1901	87
" License fees		22-23
" " Comparative statement for 1899-1900 and 1900 and 1901		81
" " issued, material used and quantity produced		80
" Quantity taken for consumption		22-23
" Raw leaf		22-23
" " scraps and cuttings	Duly collected on actual weights	86
" " warehouse returns		84-85
" " " comparative statement for 1899-1900 and 1900-1901		86
" Revenue		6 to 9
" " comparative monthly statement showing increase or decrease for 1899-1900 and 1900-1901		28-29
" " refunds		35 to 31
" " warehouse returns		82
" " " comparative statement for 1899-1900 and 1900-1901		83
" Snuff—Quantity taken for consumption		22-23
" Stamps	Commission	129
" "	" vote for	60
Tobin, John & Co	Refunds	37, 39, 40
Tomlinson, W. M.	Salary	148
Tompkins, P.	Distribution of seizures	139
"	Salary	125
Topley, W. J	Contingencies	142, 156
Toronto, B. & M. Co	Refunds	32, 35
" Electric Light Inspection District	Contingencies	155
" Excise Division	" and salaries	120-121
" "	Distribution of seizures	137
" Gas District	Contingencies and salaries	152
" Weights and Measures Division	" "	147
Toronto Daily Star	Subscription	145
Toronto Saturday Night	"	145
Toronto World, The	"	145
Toupin, F. X. J. A.	Salary	121
Tourchot, A. L. J.	Contingencies	142
"	Salary	141
Tracy, J. P.	"	118
Traversy, F. X	Duty-pay	130
Tremain, S.	Refunds	38
Tribune, La, St. Hyacinthe	Subscription	145
Trudel, E	Distribution of seizures	138
Tucker & Reeves	General excise contingencies	128
Tuckett, G. T.	Refunds	37. 38
Tucket & Son Co. The G. E	"	35, 36, 37, 38, 39, 41
Turgeon, P. L.	Contingencies	133
Tyrell, Miss M.	Salary	141
Union Brewing Co	Refunds	33
Union des Cantons d'Est	Subscription	145
Union de St. Hyacinthe, L'	"	145
Vachon, J. B.	Culler's annuity	135
Valade, F. X.	Food analysis	141
Valin, J. A. G.	Extra services	142
Valin, J. E.	Salary	144
Vancouver Excise Division	Contingencies and salaries	126
" Gas District	" "	153
Vancouver World	Subscription	145
Veniot, P. J	Commission	129
Verner, F	Salary	122
Verner, T. H.	"	125
Victoria Electric Light District	Contingencies	155
" Excise Division	" and salaries	126
" Gas District	" and salary	153
" Weights and Measures Division	" and salaries	149
Victoria Phœnix Brewing Co	Refunds	33, 34
Victoriaville Excise Division	Contingencies and salaries	124
Villeneuve, Jacques	Culler's annuity	134

		Page.
Villeneuve, J	Salary	122
Vinegar	License fees	22-23
"	Quantity taken for consumption	22-23
" Revenue, comparative statement showing monthly increase or decrease for 1899-1900 and 1900-1901		28-29
" Statement showing transactions in bonded manufactures		22-23
Waddingham, L. T	Salary	119
Wainwright, F. G	"	125
Walkerville Brewing Co., Ltd	Refunds	32, 33, 34
Wallace, G. H.	Commission	129
Waller, John	Duty-pay	130
"	Salary	120
Walsh, D. J	Duty-pay	130
"	Salary	116
Walsh, William	Culler's annuity	134
Warburton & McKinnon	Law costs	156
Wardell, R. S. R	Salary	117
Warren, G. S	Distribution of seizures	137
Watkins, J. A	" "	137
Watson, George	Commission	129
Watson, James	Salary	141
"	Travelling expenses	141
Watson, John	Refunds	32, 35
Watson, Miss A	Services	142
Watson, W. W	Salary	125
Waugh, Richard, J	Salaries	141, 149
"	Travelling expenses	141
Webbe, C. E. A	Salary	118
Weights and Measures	Contingencies, vote for	60
" "	Deputy Inspector's account (old division)	46
" "	Expenditures (old division)	49
" "	" pages 47-48. Details of.	147-150
" "	Inspection Division in account with expenditure	47-48
" "	Inspection Division in account with revenue	44-45
" "	Inspector's account	47
" "	Monthly deposits	24 to 27
" "	Revenue	43
" "	Salaries, vote for	60
Weir, James	Duty-pay	130
"	Salary	117
Westman, Thomas	"	144
Weyms, C	Duty-pay	130
"	Salary	116
Wheatley, A. E	"	147
Whelan, W. F	"	133
White, J. B	"	119
Whitehead, J. P	"	118
Whitehead, Mrs. J	Contingencies	128-142
Wiarton Docks	Lessee	16
Wickwire, W. N	Refunds	33, 34, 35
Williams, J. S	"	36, 38, 39, 41
Williams & Baker	"	33
Williams, S	Lessee	110
Wills, E. A	Inspection of staples	140
Wilmot, J. B	Contingencies and salary	148
Wilson, C. A	Inspector of staples	140
Wilson, D	Salary	118
Wilson, D. H	Refunds	33, 34
Wilson, J. E	Contingencies	155
"		153
Wilson, M. G	Refunds	31
Windsor Excise Division	Contingencies and salaries	121
" "	Distribution of seizures	137
" Weights and Measures Division	Contingencies and salaries	147
Winnipeg Daily Tribune. The	Subscription	145
Winnipeg Electric Light District	Contingencies	155
" Excise Division	" and salaries	125
" "	Distribution of seizures	139
" Gas District	Contingencies and salary	153
" Weights and Measures Division	" and salaries	149
Winsor, J. A	Salary	147
Winter, C. F	"	144

		Page.
Wiser, J. P.	Refunds	32
Witness, The Montreal	Subscription	145
Witteman, M.	Refunds	33
Wolfenden, W.	Salary	126, 153
Wood, J. A.	"	119
Woodhouse, J. A.	Refunds	32
Woodman, C.	"	33
Woodward, G. W.	Duty-pay	130
"	Salary	116
Wright, Alex., & Co.	Contingencies	154
Wright, Miss S. E.	Salary	141
Wright, R. J	"	147
Wright, S. W.	Law costs	128
Yetts, Robert P.	Salary	144
Young, Levi	Lessee	110
Young, R. E.	Salary	120

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1901

PART II

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1901

[No. 13—1902.]

REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE

ON THE

INSPECTION OF WEIGHTS AND MEASURES, GAS AND ELECTRIC LIGHT

To the Honourable
The Minister of Inland Revenue.

SIR,—I have the honour to submit herewith my annual report on the inspection of weights and measures, gas and electric light, with the usual statements in connection therewith, for the fiscal year ended June 30, 1901.

1. The total revenue collected during the year for the inspection of weights and measures was $54,385.56, as against $53,635.04 collected during the year ended June 30, 1900.

2. The total expenditure was $71,280.37, as against $68,707.55 expended during the year ended June 30, 1900.

3. Appendix 'A' gives a summary statement of the receipts and expenditures of each inspection division.

4. In Appendices 'B,' 'C' and 'D' will be found a detailed statement of weights, measures and weighing machines presented for verification verified and rejected during the year. The number of all descriptions may be summarily stated as follows :—

—	Presented.	Verified.	Rejected.	Percentage of Rejections.
Weights, Dominion	62,281	61,553	728	1·16
Measures of capacity, Dominion	84,327	84,205	122	0·14
Lineal measures	7,122	6,978	144	2·02
Balances, equal arms	12,089	11,784	305	2·52
" steelyards	4,654	4,520	134	2·87
" platform scales	31,000	29,964	1,036	3·34
Troy weights	67	67	.....	.....
Irregular weights	687	685	2	·29
" measures	488	486	2	·40
" balances	5,876	5,688	188	3·20

Inspection of Gas.

5. The total revenue collected during the fiscal year ended June 30, 1901, for the inspection of gas and gas meters, was $22,173.55, as compared with $21,106.75 collected during the year ended June 30, 1900.

6. The total expenses were $23,338.49, as against $22,706.16 expended during the year ended June 30, 1900.

7. Appendix 'E' gives a summary statement of the receipts and expenditures of each gas inspection district.

8. A statement of the illuminating power and purity of gas inspected during the year will be found in Appendix 'F.'

9. The illuminating power, where inspection has been made, has been as follows:—

Places.	Number of Tests made.	Number of times below Standard.	Places.	Number of Tests made.	Number of times below Standard.
Barrie	12		Sarnia	12	
Belleville	34		Stratford	12	1
Berlin	12		St. Catharines	12	
Brantford	12		St. Thomas	14	
Brockville	12		Toronto	104	
Chatham	12		Windsor	13	1
Cobourg	12		Woodstock	12	
Cornwall	12		Montreal	102	
Deseronto	8		Quebec	12	
Dundas	12		Sherbrooke	12	2
Galt	12		Fredericton	55	1
Guelph	12		Moncton	9	
Hamilton	12		St. John, N.B	47	1
Ingersoll	12		Halifax	12	
Kingston	22		Pictou	10	
Listowell	12		Yarmouth	10	
London	19		Charlottetown	12	
Napanee	10		Winnipeg	12	
Ottawa	24		Nanaimo	12	
Owen Sound	12		New Westminster		
Peterborough	12		Vancouver	12	
Port Hope	12		Victoria	11	

The revenue derived from the inspection of electric light was as follows :—

Fees for inspection of meters, &c	$ 10,565 52
Registration of companies	4,797 50
	$ 15,363 02
The expenses of inspection (annual)	4,908 71
	$ 10,454 31
Expended on standard instruments, &c.	4,199 26
Leaving a net revenue of	$ 6,255 05

Appendix 'K' contains extracts from a paper on Dominion Electrical Standards read before the Canadian Electrical Association by Mr. O. Higman, Chief Electrical Engineer of the Department, on June 20, 1901.

Since the year 1896–97 the two services of gas and electric light inspection, which are conducted largely by the same staff of officers, have reached that point at which they have ceased to be a burden upon the general taxpayer, as shown below :—

Year.	Gas and Electric Light.	
	Revenue.	Expenditure, Exclusive of cost of Standard Instruments.
	$ cts.	$ cts.
1897–98	28,150 00	23,402 00
1898–99	30,015 25	23,436 30
1899–1900	35,523 50	26,424 48
1900–01	37,536 57	28,247 20

The kindred service of weights and measures inspection, it will be observed, has, the same as last year, earned somewhat over three-fourths of its annual cost, the expenditure as already stated having been $71,280.37, against a revenue of $54,385.56.

Owing to the adoption, by many of the leading nations of the world, of the 'Metric System' of weights and measures, and in order that the people of our country might become conversant therewith, the department has distributed to Boards of Trade and Educational Institutions throughout the Dominion, over one hundred sample sets of Metric Weights and Measures. It has also recently procured standards which will be placed in the hands of Inspectors at the leading Commerical centres, by means of which weights of the Metrical System may, when required, be verified.

These standard sets contain the following weights, viz.:—20, 10, 5, 2, (2). Kilogrammes, I Kilogramme, 500, 200, (2). 100, 50, 20 (2). 10, 5, 2, (2). Grammes, 1 gramme, 5, 2, (2). Decigrammes, I decigramme, 5, 2, (2). Centigrammes, I Centigramme, 5, 2, (2). Milligrammes, I Milligramme.

I have the honour to be, sir,

Your obedient servant,

Inland Revenue Dept.,
Ottawa, August 10, 1901.

W. J. GERALD,
Deputy Minister.

APPENDIX A.

STATEMENT of Weights and Measures Expenditures and Revenues, for the Year ended June 30, 1901.

Divisions.	Inspectors and Assistants.	Expenditures.							Revenues
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Belleville...	Johnson, Wm.. Slattery, T..... Irwin, S..... Behan, J. J.... Errett, R. W..	3,399 92	.....	499 92	290 00	1,304 69	451 63	5,946 16	3,755 65
Hamilton...	Freed, A. T.... McDonald, J... Marentette, A.. Fitzgerald, E. W Laidman, R. H. Wheatley, E. A. Jarvis, H.....	5,899 84	. ...	.....	.....	1,101 90	108 40	7,110 14	8,992 26
Ottawa.....	Macdonald, J. A. Elliott, T. H... McFarlane, Jas. Breen, J..... Winsor, J.....	3,862 65	.....	... .	250 00	1,123 20	198 20	5,434 05	5,415 20
Toronto...	Kelly, D. .... Milligan, R. J.. Wright, R..... Murdoch, J.... Smith, J. C....	4,099 88	... ..	.....	.....	1,652 10	137 17	5,889 15	6,396 08
Windsor....	Hayward, W. J. Coughlin, D.... Thomas, J. S... Hughes, R. A..	3,449 76	1 85	.....	.....	1,300 87	201 96	4,954 44	5,698 10
	Ontario.....	20,712 05	1 85	499 92	540 00	6,482 76	1,097 36	29,333 94	30,257 29

APPENDIX A—*Continued.*

STATEMENT of Weights and Measures Expenditures and Revenues, &c.—*Continued.*

Divisions.	Inspectors and Assistants.	Expenditures.							Revenues
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Montreal..	Chalus, J. O.... Daoust, J. A... Gervais, S. .... Hébert, J. A. P. Baker, J. S.... Tomlinson, W.. Collins, D. .... Dessert, V..... Fournier, L. A.	8,199 68	... .	....	.....	1,683 30	325 69	10,208 67	12,139 35
Quebec.	Guay, G. N.... LeBel, J. A. W. Kelly, M. J.... Pinhey, H. .. Chabot, F. X.. Guay, A. ..... Petit, J. B..... Moreau, A.....	5,222 13	.....	62 49	200 00	1,533 67	299 67	7,317 96	2,885 85
Three Rivers	Gravel, A. I. .. Provost, J. J...	1,699 96	. . .	.....	... .	439 60	9 59	2,149 15	1,093 90
	Quebec.	15,121 77	.. .	62 49	200 00	3,656 57	634 95	19,675 78	16,119 10
St. John, N.B.	Wilmot, J. B.. Cowan, E..... Richard, D.... Bernier, J. A..	2,770 96	.....	299 30	.....	417 55	18 14	3,505 95	1,413 49
Cape Breton	Lawrence, G. C..	800 00	.....	... .	37 50	281 40	27 85	1,146 75	384 79
Halifax.....	Frame, A..... Waugh, R. J...	1,599 96	.....	.....	375 00	202 20	155 24	2,332 40	696 40
Pictou	Dustan, W. M. Chisholm, J. J.	1,600 00	....	.....	12 50	149 17	49 48	1,811 15	574 35
	Nova Scotia...	3,999 96	.....	... .. .	425 00	632 77	232 57	5 290 30	1,655 54
Chariottet'n P.E.I.	Davy, E. .... Hughes, H.....	1,500 00	.....	.....	.....	109 44	61 47	1,670 91	327 50
Winnipeg, Man.	Magness, R.... McDonald, A.W Francis, G. M.. Girdlestone, R. J. M..... Ross, H. E... .	2,899 88	.....	1,058 41	108 00	1,311 60	99 86	5,477 75	3,753 03

APPENDIX A—*Concluded.*

STATEMENT of Weights and Measures Expenditures and Revenues, &c.—*Concluded.*

Divisions.	Inspectors and Assistants.	Expenditures.							Revenues
		Salaries.	Seizure expenses.	Special assistance.	Rent.	Travelling expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Calgary, N.W.T.	Thomas, P. Costello, J. W.	899 92	.....	.....	.....	166 74	.....	1,066 66	464 41
Victoria, B.C.	Findley, H. McAloney, J.A	1,149 84	....	.....	.....	840 70	81 50	2,072 04	395 20

RECAPITULATION.

Ontario	20,712 05	1 85	499 92	540 00	6,482 76	1,097 36	29,333 94	30,257 29
Quebec	15,121 77	....	62 49	200 00	3,656 57	634 95	19,675 78	16,119 10
New Brunswick	2,770 96	.....	299 30	.....	417 55	18 14	3,505 95	1,413 49
Nova Scotia	3,999 96	.....	.....	425 00	632 77	232 57	5,290 30	1,655 54
Prince Edward Island	1,500 00	.....	.....	.....	109 44	61 47	1,670 91	327 50
Manitoba	2,899 88	.....	1,058 41	108 00	1,311 60	99 86	5,477 75	3,753 03
North-west Territories	899 92	.....	.....	.....	166 74	.....	1,066 66	464 41
British Columbia	1,149 84	.....	.....	.....	840 70	81 50	2,072 04	395 20
Commissioner of Standards	733 26	.....	.....	.....	.....	.....	733 26	.....
General Contingencies	.....	.....	.....	.....	.....	1,510 16	1,510 16	.....
Printing	.....	.....	.....	.....	.....	575 23	575 23	.....
Stationery	.....	.....	.....	.....	.....	132 69	132 69	.....
Totals	49,787 64	1 85	1,920 12	1,273 00	13,618 13	4,443 93	71,044 67	54,385 56

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province,

INSPECTION DIVISIONS.	WEIGHTS.								MEASURES OF CAPACITY.					
	Dominion.			Troy.		Miscellaneous.			Dominion.			Miscellaneous.		
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
Ontario.														
Belleville	3,175	3,175	....	....	....	7	7	....	6,723	6,723	....	2	2	....
Hamilton	10,784	10,755	29	....	....	134	134	....	5,171	5,167	4	13	13	....
Ottawa	2,904	2,817	87	....	....	2	2	....	2,347	2,254	93	2	2	....
Toronto	5,031	5,031	....	14	14	21	21	....	11,640	11,640	....	283	283	....
Windsor	4,690	4,690	....	....	....	..	.....	....	15,941	15,941	....	3	3	....
Totals	26,584	26,468	116	14	14	164	164	....	41,822	41,725	97	303	303	. .
Quebec.														
Montreal	14,744	14,168	576	8	8	23	23	....	23,684	23,684	....	44	44	...
Quebec	11,014	10,982	32	....	....	497	495	2	7,102	7,097	5	3	3	....
Three Rivers	1,996	1,996	....	....	....	....	. .. .	....	1,194	1,177	17	....	....	....
Totals	27,754	27,146	608	8	8	520	518	2	31,980	31,958	22	47	47	....
New Brunswick.														
St. John	2,086	2,086	....	....	...	1	1	....	4,967	4,966	1	5	5	....
Nova Scotia.														
Cape Breton	415	413	2	....	...	.....	.....	....	436	434	2	3	3	....
Halifax	1,218	1,216	2	29	29	.....	.....	....	1,191	1,191	....	30	28	
Pictou	677	677	.. .	....	....	2	2	....	865	865	....	21	21	....
Totals	2,310	2,306	4	29	29	2	2	....	2,492	2,490	2	54	52	2
Prince Edward Island														
Charlottetown	400	400	....	....	....	.....	.....	....	282	282	....	.. .	....	....
Manitoba.														
Winnipeg	2,419	2,419	..	....	....	.....	.....	....	2,369	2,369	....	71	71	....
Calgary	351	351	...	....	....	.....	.....	..	292	292	....	8	8	....
Totals	2,770	2,770	....	....	....	.....	. ..	....	2,661	2,661	....	79	79	....
British Columbia.														
Victoria	377	377	....	16	16	.....	.....	....	123	123	....	...	....	....

B.

1901, showing the Total Number brought for Verification, Verified and Rejected, for and for the whole Dominion.

Measures of Length.			Balances, &c.											
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.			Miscellaneous.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verificatio .	Verified.	Rejected.
266	266	....	576	576	....	143	143	....	2,376	2,376	.....	41	41	....
627	522	105	2,863	2,742	121	2,107	2,041	66	6,792	6,185	607	1,097	1,093	4
561	555	6	532	471	61	34	30	4	1,595	1,474	121	3,383	3,213	170
830	830	....	996	996	....	505	505	...	2,992	2,992	....	668	668	...
326	326	....	920	906	14	337	337	....	3,115	3,098	17	.....	.....	....
2,610	2,499	111	5,887	5,691	196	3,126	3,056	70	16,870	16,125	745	5,189	5,015	174
2,601	2,594	7	2,704	2,611	93	1,112	1,060	52	6,843	6,644	199	306	296	10
1,057	1,051	6	1,656	1,649	7	82	78	4	1,676	1,662	14	149	149	....
118	108	10	310	307	3	10	10	....	734	732	2	2	2	....
3,776	3,753	23	4,670	4,567	103	1,204	1,148	56	9,253	9,038	215	457	447	10
114	114	....	394	394	....	57	57	....	830	825	5	68	68	....
98	88	10	81	80	1	13	13	...	272	270	2	.....	.....	....
96	96	.. .	227	226	1	35	34	1	464	442	22	8	80	3
48	48	...	139	139	....	10	10	....	367	367	.... .	1	12	....
242	232	10	447	445	2	58	57	1	1,103	1,079	24	95	92	3
3	3	....	75	75	....	18	18	....	258	258	.....	6	6	....
248	248	....	473	469	4	150	143	7	2,131	2,084	47	52	51	1
129	129	....	66	66	....	15	15	....	252	252	. ...	7	7	....
377	377	....	539	535	4	165	158	7	2,383	2,336	47	59	58	1
.....	....	....	77	77	....	26	26	....	303	303	.. ..	2	2	....

APPENDIX

RETURN of Weights and Measures Inspected during the Fiscal Year ended June 30, each Division, for each Province,

RECAPIT

Inspection Divisions.	Weights.								Measures of Capacity.					
	Dominion.			Troy.		Miscellaneous.			Dominion.			Miscellaneous.		
	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
Ontario	26,584	26,468	116	14	14	164	164	...	41,822	41,725	97	303	303	....
Quebec	27,754	27,146	608	8	8	520	518	2	31,980	31,958	22	47	47	....
New Brunswick	2,086	2,086	....	....	....	1	1	....	4,967	4,966	1	5	5	...
Nova Scotia	2,310	2,306	4	29	29	2	2	....	2,492	2,490	2	54	52	2
Prince Edward Island	400	400	....	....	....	.....	.....	....	282	282	....	....	....	....
Manitoba	2,770	2,770	....	....	...	.....	.....	....	2,661	2,661	....	79	79	....
British Columbia	377	377	....	16	16	.....	.....	...	123	123	....	....	....	....
Grand totals	62,281	61,553	728	67	67	687	685	2	84,327	84,205	122	488	486	2

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 13

B—*Continued.*

1900, showing the Total Nunber brought for Verificatlon, Verified and Rejected, for and for the whole Dominion.

ULATION.

Measures of Length.			Balances, &c.											
			Equal Armed.			Steelyards.			Platform Scales, Weigh Bridges, &c.			Miscellaneous.		
Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.	Brought for Verification.	Verified.	Rejected.
2,610	2,499	111	5,887	5,691	196	3,126	3,056	70	16,870	16,125	745	5,189	5,015	174
3,776	3,753	23	4,670	4,567	103	1,204	1,148	56	9,253	9,038	215	457	447	10
114	114	....	394	394	....	57	57	....	830	825	5	68	68	....
242	232	10	447	445	2	58	57	1	1,103	1,079	24	95	92	3
3	3	....	75	75	....	18	18	....	258	258	.....	6	6	....
377	377	....	539	535	4	165	158	7	2,383	2,336	47	59	58	1
.....	.....	....	77	77	....	26	26	....	303	303	.....	2	2	....
7,122	6,978	144	12,089	11,784	305	4,654	4,520	134	31,000	29,964	1,036	5,876	5,688	188

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each Fiscal Year ended

INSPECTION DIVISION.	DOMINION Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville	....	....	....	....	11	21	98	235	392	654	587	334	291	268
Hamilton	....	34	....	....	1	3	228	132	1,663	3,011	3,017	637	546	524
Ottawa	60	....	....	...	34	*11 21	148	157	372	536	473	304	278	205
Toronto	....	....	3	5	8	12	126	212	506	1,033	1,007	524	461	420
Windsor	....	....	. .	....	4	6	117	220	542	993	847	485	447	370
Totals	60	34	3	5	58	74	717	956	3,475	6,227	5,931	2,284	2,023	1,787
Quebec.														
Montreal	416	90	8	†1 2	‡3 24	32	744	774	1,295	2,576	2,421	1,750	1,639	1,338
Quebec	....	92	20	54	122	187	855	702	899	1,528	1,518	1,437	1,471	1,141
Three Rivers	....	....	....	....	4	3	147	129	241	343	316	279	278	171
Totals	416	182	28	57	153	222	1,746	1,605	2,435	4,447	4,255	3,466	3,388	2,650
New Brunswick.														
St. John	....	....	....	....	....	5	92	136	196	418	408	224	178	157
Nova Scotia.														
Cape Breton	....	31	18	14	9	2	24	21	51	99	79	39	18	8
Halifax	....	3	2	2	5	8	49	64	120	274	225	152	122	84
Pictou	....	....	....	...	....	7	25	36	68	172	143	57	48	45
Totals	.. .	34	20	16	14	17	98	121	239	545	447	248	188	137
Prince Edward Island.														
Charlottetown	....	....	....	....	....	....	12	10	42	107	88	42	35	31
Manitoba.														
Winnipeg	....	8	.. .	....	3	4	64	5	401	531	476	202	186	176
Calgary	....	....	1	1	....	1	13	5	50	71	70	29	28	28
Totals	....	8	1	1	3	5	77	10	451	602	546	231	214	204
British Columbia.														
Victoria	....	....	...	....	....	....	2	2	25	79	75	50	48	45

* 8 lbs. † 25 lbs. ‡ 14 lbs.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

C.

Denomination presented for Verification in each Inspection Division, during the June 30, 1901.

Weights.							Troy Weights.	Miscellaneous Weights.	Lineal Measures.										Miscellaneous Measures.
dupois.																			
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.			6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	
210	57	12	3	2	....	3,175	.....	7	....	....	266	..	..	..	..	..	..	....	266	.....
501	382	84	9	12	....	10,784	.....	134	....	....	627	..	..	..	..	..	..	....	627	.....
164	85	37	13	6	....	2,904	.....	.....	....	....	561	..	..	..	..	..	..	....	561	.....
361	203	89	28	33	....	5,031	14	21	....	....	830	..	..	..	..	..	..	....	830	.....
343	219	76	15	5	1	4,690	....	.....	....	....	326	..	..	..	..	..	..	....	326	.....
1,579	946	298	68	58	1	26,584	14	162	....	....	2,610	..	..	..	..	..	..	..	2,610	.....
1,001	413	111	54	51	1	14,744	8	23	....	....	2,601	..	..	..	..	..	..	....	2,601	.....
759	190	28	7	3	1	11,014	.....	497	....	....	1,057	..	..	..	..	..	..	....	1,057	.....
69	16	...	...	....	....	1,996	...	...	....	....	118	..	..	..	..	..	..	....	118	.....
1,829	619	139	61	54	2	27,754	8	520	....	....	3,776	..	..	..	..	..	..	....	3,776	.....
121	43	5	1	2	....	2,086	.....	1	....	....	114	..	..	..	..	..	..	....	114	.....
2	....	....	...	....	....	415	.....	....	....	....	98	..	..	..	..	..	..	....	98	.....
66	28	6	5	3	....	1,218	29	.....	....	....	96	..	..	..	..	..	..	....	96	.....
40	22	10	2	2	....	677	.....	2	....	....	48	..	..	..	..	..	..	....	48	.....
108	50	16	7	5	....	2,310	29	2	....	....	242	..	..	..	..	..	..	....	242	....
25	7	1	....	....	....	400	.....	... ..	....	....	3	..	..	..	..	..	..	....	3	.....
159	96	62	35	7	4	2,419	.....	.....	...	....	248	..	..	..	..	..	..	....	248	.....
25	15	7	4	3	....	351	.....	.... .	....	...	128	1	..	..	..	..	..	...	129	.....
184	111	69	39	10	4	2,770	.....	.....	....	....	376	1	..	..	..	..	..	....	377	.....
38	9	4	....	....	....	377	16	.....	....	....	....	..	.	..	..	..	..	....	.....	.....

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of each Year ended

INSPECTION DIVISION.	DOMINION Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Belleville	....	....	....	....	11	21	98	235	392	654	587	334	291	268
Hamilton	....	34	....	...	1	3	228	132	1,660	3,006	3,009	632	543	522
Ottawa	60	....	....	....	34	*11 18	126	139	346	524	469	304	276	205
Toronto	....	....	3	5	8	12	126	212	506	1,033	1,007	524	461	420
Windsor	...	....	.. .	....	4	6	117	220	542	993	847	485	447	370
Totals	60	34	3	5	58	71	695	938	3,446	6,210	5,919	2,279	2,018	1,785
Quebec.														
Montreal	416	90	8	†1 2	‡3 24	31	709	733	1,244	2,477	2,328	1,669	1,572	1,277
Quebec	..	92	20	54	121	186	855	698	898	1,524	1,515	1,431	1,466	1,139
Three Rivers	....	....	....	...	4	3	147	129	241	343	316	279	278	171
Totals	416	182	28	57	152	220	1,711	1,560	2,383	4,344	4,159	3,379	3,316	2,587
New Brunswick.														
St. John	....	....	...	....	....	5	92	136	196	418	408	224	178	157
Nova Scotia.														
Cape Breton	....	30	18	14	9	2	23	21	51	99	79	39	18	8
Halifax	....	3	2	2	5	8	49	62	120	274	225	152	122	84
Pictou	...	....	....	...	....	7	25	36	68	172	143	57	48	45
Totals	....	33	20	16	14	17	97	119	239	545	447	248	188	137
Prince Edward Island.														
Charlottetown	....	...	....	....	....	....	12	10	42	107	88	42	35	31
Manitoba.														
Winnipeg	....	8	....	....	3	4	64	5	401	531	476	202	186	176
Calgary	....	..	1	1	....	1	13	5	50	71	70	29	28	28
Totals	....	8	1	1	3	5	77	10	451	602	546	231	214	204
British Columbia.														
Victoria	....	....	....	....	...	....	2	2	25	79	75	50	48	45

*8 lbs. †25 lbs. ‡14 lbs.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

C—*Continued.*

Denomination, Inspected and Verified in each Inspection Division, during the Fiscal June 30, 1901.

Weights.									Lineal Measures.										
dupois.							Troy Weights.	Miscellaneous.											Miscellaneous Measures.
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.			6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	
210	57	12	3	2	....	3,175	.....	7	....	....	266	..	..	..	..	..	..	....	266	....
499	381	84	9	12	...	10,755	.....	134	....	....	522	..	..	..	..	..	..	....	522	.....
164	85	37	13	6	....	2,817	.....	.....	....	....	555	..	..	..	..	..	..	....	555	.....
361	203	89	28	33	....	5,031	14	21	....	....	830	..	..	..	..	..	..	....	830	.....
343	219	76	15	5	1	4,690	.....	....	....	....	326	..	..	..	..	..	..	....	326	...
1,577	945	298	68	58	1	26,468	14	162	....	...	2,499	..	..	..	..	..	..	....	2,499	.....
965	404	109	54	51	1	14,168	8	23	....	....	2,594	..	..	..	..	..	..	....	2,594	.....
757	187	28	7	3	1	10,982	.....	495	....	....	1,051	..	..	..	..	..	..	..	1,051	.....
69	16	....	....	....	....	1,996	.....	. .	...	...	108	..	..	..	..	..	..	....	108	.....
1,791	607	137	61	54	2	27,146	8	518	....	.. .	3,753	..	..	..	..	..	..	...	3,753	.....
121	43	5	1	2	....	2,086	..	1	....	....	114	..	..	..	..	..	..	....	114	.. ...
2	.....	...	....	....	....	413	.....	.....	....	..	88	..	..	.	..	..	..	....	88	...
66	28	6	5	3	....	1,216	29	. ..	....	....	96	..	..	..	..	..	..	....	96	.. ..
40	22	10	2	2	....	677	.....	2	....	....	48	..	..	..	..	..	..	....	48	.....
108	50	16	7	5	...	2,306	29	2	....	....	232	.	..	..	..	..	..	....	232	.. ...
25	7	1	....	...	...	400	...	....	....	....	3	..	..	..	..	..	..	....	3	.....
159	96	62	35	7	4	2,419	.....	.....	....	...	248	..	..	..	..	..	..	....	248	.....
25	15	7	4	3	....	351	....		...	....	128	1	..	..	..	..	..	....	129	.....
184	111	69	39	10	4	2,770	.....	.....	...	....	376	1						....	377	.
38	9	4	....	....	....	377	.....	.....	...	....	.....	..	..	..	..	..	..	....	.....	.... .

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Weights and Lineal Measures of Year ended

INSPECTION DIVISION.	DOMINION													
	Avoir													
	60 lbs.	50 lbs.	30 lbs.	20 lbs.	10 lbs.	7 lbs.	5 lbs.	4 lbs.	3 lbs.	2 lbs.	1 lb.	8 ozs.	4 ozs.	2 ozs.
Ontario.														
Hamilton									3	5	8	5	3	2
Ottawa						3	22	18	26	12	4		2	
Totals						3	22	18	29	17	12	5	5	2
Quebec.														
Montreal						1	35	41	51	99	93	81	67	61
Quebec					1	1		4	1	4	3	6	5	2
Three Rivers														
Totals					1	2	35	45	52	103	96	87	72	63
Nova Scotia.														
Cape Breton		1					1							
Halifax								2						
Pictou														
Totals		1					1	2						

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

C—*Concluded.*

each Denomination, Rejected in each Inspection Division during the Fiscal Year ended June 30, 1900.

Weights.							Troy Weights.	Miscellaneous Weights.	Lineal Measures.										Miscellaneous Measures.
dupois.																			
1 oz.	8 drs.	4 drs.	2 drs.	1 dr.	½ dr.	Total Number.			6 feet.	5 feet.	1 yard.	½ yard.	2 feet.	1 foot.	½ foot.	100 feet chains.	66 feet chains.	Tape or Riband.	Total Number.	
2	1	....	....	....	....	29	.....	.....	....	....	105	..	..	..	..	..	..	...	105	.....
.....	.....	...	....	....	....	87	.....	.....	....	....	6	..	..	..	..	..	..	....	6	.....
2	1	....	....	....	....	116	.....	.....	....	....	111	..	..	..	..	..	..	....	111	... ..
36	9	2	....	....	....	576	.....	....	....	....	7	..	..	..	..	..	..	....	7	.....
2	3	....	....	....	....	32	.....	....	....	....	6	..	..	..	..	..	..	...	6	.....
.....	.. ..	....	....	...	....	.... . .	... .	.. . .	.. .	....	10	..	..	..	..	..	..	....	10	.....
38	12	2	....	....	....	608	.....	.....	...	....	23	..	..	..	..	..	..	...	23	.....
....	.. ..	....	....	....	....	2	.....	.. ..	..	....	10	..	..	..	..	..	..	.. .	10	.....
....	.....	....	....	....	....	2	.... .	.....	....	....	.... .	..	..	..	..	..	..	....	.....	.....
.....	.....	....	....	...	...	.. ....	.....	2	....	....	.....	..	..	..	..	..	..	....	.....	.....
....	.....	..	....	....	....	4	.. ...	2	....	...	10	..	..	.	..	..	..	.. .	10	.... .

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Division, during the Fiscal

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion.												
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.	5 lbs. and under.
Ontario.													
Belleville	161	502	787	1,033	1,237	1,591	1,198	207	6	1	6,723	2	158
Hamilton	33	127	195	663	990	1,664	1,193	306	....	....	5,171	13	1,509
Ottawa	....	13	45	412	645	742	386	92	9	....	2,347	2	153
Toronto	68	142	278	1,490	1,939	3,162	3,768	774	19	....	11,640	283	335
Windsor	1,255	380	327	1,085	1,866	5,414	3,496	2,052	66	....	15,941	3	299
Totals	1,517	1,167	1,632	4,683	6,677	12,573	10,496	3,431	100	1	41,822	303	2,454
Quebec.													
Montreal	1	644	1,119	2,867	4,240	5,739	6,056	2,662	356	....	23,684	44	815
Quebec	1	174	316	1,142	1,659	1,683	1,191	549	87	....	7,102	3	175
Three Rivers	.....	40	22	193	308	300	206	114	11	....	1,194	...	88
Totals	2	858	1,457	4,202	6,207	7,722	7,753	3,325	454	....	31,980	47	1,078
New Brunswick.													
St. John	....	130	116	579	1,378	1,437	1,030	175	122	....	4,967	5	70
Nova Scotia.													
Cape Breton	2	6	1	84	159	140	39	4	1	....	436	3	27
Halifax	.....	35	33	190	298	292	203	98	42	....	1,191	30	53
Pictou	.....	20	23	98	260	274	125	63	2	....	865	21	44
Totals	2	61	57	372	717	706	367	165	45	...	2,492	54	124
P. E. Island.													
Charlottetown	....	.....	.....	13	33	138	89	9	....	...	282	...	18
Manitoba.													
Winnipeg	17	5	11	503	582	647	568	34	1	1	2,369	71	134
Calgary	5	.....	1	55	91	85	48	7	....	....	292	8	27
Totals	22	5	12	558	673	732	616	41	1	1	2,661	79	161
British Columbia.													
Victoria	...	.....	....	7	12	37	67	.....	....	....	123	....	30

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

D.

Weighing Machines of each Denomination Presented for Verification in each Inspection Year ended June 30, 1901.

BALANCES.

With Equal Arms.			Steel yards with Divided Arms.				Weigh Bridges or Platform Scales.						Totals.	Miscellaneous.
5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.		
418	.....	.....	138	1	3	1	774	184	785	221	121	291	3,095	41
1,354	.. ..	.....	2,074	30	3	.....	3,530	127	2,525	295	72	243	11,762	1,097
379	.....	.. .	28	6	.....	.....	690	189	531	55	57	73	2,161	3,383
661	.....	. ...	464	28	10	3	952	122	1,210	272	65	371	4,493	668
621	.....	.....	327	5	5	.. ...	1,208	125	1,198	225	68	291	4,373	.....
3,433	. ...	.....	3,031	70	21	4	7,154	747	6,249	1,068	383	1,269	25,883	5,189
1,881	.....	8	1,063	15	7	27	2,381	1,235	2,496	216	230	285	10,659	306
1,358	37	86	78	3	1	.. ..	443	657	445	59	35	37	3,414	497
222	.....	... .	10	.....	.....	.....	227	293	199	1	7	7	1,054	2
3,461	37	94	1,151	18	8	27	3,051	2,185	3,140	276	272	329	15,127	805
324	. ...	.....	56	.....	1	.....	377	170	215	12	17	39	1,281	68
47	3	4	11	2	....	.. .	155	52	33	3	20	9	366	.... .
173	1	.....	35	.....	. ....	.....	228	61	102	16	6	51	726	83
95	.....	.....	10	.... .	....	.....	157	70	68	20	17	35	516	12
215	4	4	56	2	.....	.....	540	183	203	39	43	93	1,608	95
57	....	... .	18	.....	. .	.....	77	59	97	2	7	16	351	6
339	.....	.....	147	3	.....	.....	665	45	563	325	345	188	2,754	52
39	.....	.....	12	1	1	1	113	7	98	3	4	27	333	7
378	.....	....	159	4	1	1	778	52	661	328	349	215	3,087	59
47	.....	. ...	20	2	4	.....	154	17	89	7	7	29	406	2

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and Division, during the Fiscal

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion. Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.	5 lbs. and under.
Ontario.													
Belleville	161	502	787	1,033	1,237	1,591	1,198	207	6	1	6,723	2	158
Hamilton	33	127	194	663	988	1,664	1,192	306	....	....	5,167	13	1,500
Ottawa	.....	10	32	377	619	732	383	92	9	....	2,254	2	127
Toronto	68	142	278	1,490	1,939	3,162	3,768	774	19	....	11,640	283	335
Windsor	1,255	380	327	1,085	1,866	5,414	3,496	2,052	66	...	15,941	3	292
Totals	1,517	1,161	1,618	4,648	6,649	12,163	10,037	3,431	100	1	41,725	303	2,412
Quebec.													
Montreal	1	644	1,119	2,867	4,240	5,739	6,056	2,662	356	...	23,684	44	807
Quebec	1	174	315	1,140	1,659	1,682	1,490	549	87	....	7,097	3	173
Three Rivers	.....	39	20	191	307	298	203	108	11	....	1,177	...	88
Totals	2	857	1,454	4,198	6,206	7,720	7,749	3,319	454	...	31,958	47	1,068
New Brunswick.													
St. John	... .	130	116	579	1,377	1,437	1,030	175	122	....	4,966	5	70
Nova Scotia.													
Cap Breton	2	6	1	84	159	138	39	4	1	....	434	3	27
Halifax	35	33	190	298	292	203	98	42	....	....	1,191	28	53
Pictou	.....	20	23	98	260	274	125	63	2	...	865	21	44
Totals	37	59	214	480	711	615	262	109	3	....	2,490	52	124
P. E. Island.													
Charlottetown	.. . .	.....	. ...	13	33	138	89	9	....	...	282	....	18
Manitoba.													
Winnipeg	17	5	11	503	582	647	568	34	1	1	2,369	71	133
Calgary	5	. .	1	55	91	85	48	7	....	....	292	8	27
Totals	22	5	12	558	673	732	616	41	1	1	2,661	79	160
British Columbia.													
Victoria	.....	....	.....	7	12	37	67	.....	....	. .	123	...	30

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 13

D—*Continued.*

Weighing Machines of each Denomination Presented for Verification, in each Inspection Year ended June 30, 1901.

BALANCES.

With Equal Arms.			Steel yards with Divided Arms.				Weigh Bridges or Platform Scales.						Total.	Miscellaneous.
5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs.	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.		
418	.....	.....	138	1	3	1	774	184	785	221	121	291	3,095	41
1,242	.....	.....	2,011	28	2	.....	3,348	97	2,267	228	63	182	10,968	1,093
344	....	.....	24	6	.....	.....	650	167	500	47	47	63	1,975	3,213
661	....	.....	464	28	10	3	952	122	1,210	272	65	371	4,493	668
614	.....	.....	327	5	5	.....	1,203	123	1,189	225	68	290	4,341	.....
3,279	....	.....	2,964	68	20	4	6,927	693	5,951	993	364	1,197	24,872	5,015
1,796	8	.....	1,011	15	7	27	2,349	1,194	2,432	209	195	265	10,315	296
1,353	37	86	76	1	1	.....	440	656	439	56	34	37	3,389	495
219	.....	.....	10	.....	.....	.....	227	292	198	1	7	7	1,049	2
3,368	45	86	1,097	16	8	27	3,016	2,142	3,069	266	236	309	14,753	793
324	.....	.....	56	.....	1	.....	377	169	212	12	17	38	1,276	68
46	3	4	11	2	.....	.....	154	52	33	3	20	9	363	....
172	1	.....	34	.....	.....	.....	223	58	93	13	5	50	702	80
95	....	.....	10	.....	.....	.....	157	70	68	20	17	35	516	12
313	4	4	55	2	.....	.....	534	180	194	36	42	94	1,581	92
57	.....	.....	18	.....	.....	.....	77	59	97	2	7	16	351	6
136	.....	.....	140	3	.....	.....	652	44	548	322	338	180	2,696	51
39	.....	.....	12	1	1	1	113	7	98	3	4	27	333	7
175	.....	.....	152	4	1	1	765	51	646	325	342	207	3,029	58
47	.....	.....	20	2	4	.....	154	17	89	7	7	29	406	2

W. J. GERALD,
Deputy Minister.

APPENDIX

RETURN showing the Number of Dominion Measures of Capacity, Balances and during the Fiscal Year

INSPECTION DIVISIONS.	MEASURES OF CAPACITY. Dominion.												
	Bushel.	½ Bushel.	Peck.	Gallon.	½ Gallon.	Quart.	Pint.	½ Pint.	Gill.	½ Gill.	Total Number.	Miscellaneous.	5 lbs. and under.
Ontario.													
Belleville													
Hamilton			1		2		1				4		9
Ottawa		6	13	35	26	10	3				93		26
Toronto													
Windsor													7
Totals		6	14	35	28	10	4				97		42
Quebec.													
Montreal													8
Quebec			1	2		1	1				5		2
Three Rivers		1	2	2	1	2	3	6			17		
Totals		1	3	4	1	3	4	6			22		10
New Brunswick.													
St. John					1						1		
Nova Scotia.													
Cape Breton						2					2		
Halifax												2	
Pictou													
Totals						2					2	2	
P. E. Island.													
Charlottetown													
Manitoba.													
Winnipeg													1
Calgary													
Totals													1
British Columbia.													
Victoria													

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

SESSIONAL PAPER No. 13

D—*Concluded.*

Weighing Machines of each Denomination Rejected, in each Inspection Division, ended June 30, 1901.

BALANCES.

With Equal Arms.			Steel yards with Divided Arms.				Weigh Bridges or Platform Scales.						Totals.	Miscellaneous.
5 lbs. to 50 lbs.	50 lbs. to 100 lbs.	100 lbs. and upwards.	500 lbs. and under.	500 lbs. to 1,000 lbs.	1,000 lbs. to 2,000 lbs.	2,000 lbs. and upwards.	250 lbs. and under.	250 lbs. to 500 lbs.	500 lbs. to 2,000 lbs	2,000 lbs. to 4,000 lbs.	4,000 lbs. to 6,000 lbs.	6,000 lbs. and upwards.		
112			63	2	1		182	30	258	67	9	61	794	4
35			4				40	22	31	8	10	10	186	170
7							5	2	9			1	31	
154			67	2	1		227	54	298	75	19	72	1,011	174
85			52				32	41	64	7	35	20	344	10
5			2	2			3	1	6	3	1		25	2
3								1	1				5	
93			54	2			35	43	71	10	36	20	374	12
								1	3			1	5	
1							2						3	
1			1				5	3	9	3	1	1	24	3
2			1				7	3	9	3	1	1	27	3
3			7				13	1	15	3	7	8	58	1
3			7				13	1	15	3	7	8	58	1

W. J. GERALD,
Deputy Minister.

APPENDIX E.

STATEMENT of Gas Inspection Expenditures and Revenues for the Year ended June, 30, 1901.

Districts.	Inspectors and Officers.	Expenditures.						Revenues.
		Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Totals.	
		$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Barrie	Shanacy, M	100 00				0 53	100 53	58 00
Belleville	Johnson, Wm. McRae, W. D.	349 96		164 75	35 95	62 16	612 82	132 00
Berlin	Broadfoot, S	183 29			31 50	13 78	228 57	196 50
Brockville			99 96			15 50	115 46	292 00
Cobourg	Bickle, J. W	100 00			39 00	36 80	175 80	130 75
Cornwall	Mulhern, M. M	100 00				42 30	142 30	40 25
Guelph	Broadfoot, S	200 00				12 91	212 91	263 00
Hamilton	McPhie, D. Dennis, W. A. McPhie, W. H.	2,496 73		36 00	114 85	70 52	2,718 10	1,647 25
Kingston	Behan, J. J	400 00		22 50		53 88	476 38	323 00
Listowel	Male, T	100 00		60 00		20 22	180 22	80 00
London	Nash, A. F	1,000 00	76 00	95 00	429 80	24 10	1,624 90	2,596 00
Napanee	Johnson, Wm., acting							45 75
Ottawa	Roche, H. G	1,000 00	540 00	300 00		73 40	1,913 40	607 75
Owen Sound	Graham, W. J	200 00		125 00		1 50	326 50	61 25
Peterborough	Rudkins, Wm. Rork, Thos	152 08			2 00	6 00	160 08	77 00
Sarnia	Hicks, W. H			20 00	0 25	0 75	21 00	206 25
Stratford	Rennie, Geo	200 00			9 00	7 00	216 00	73 25
Toronto	Johnstone, J. K. Pape, Jas.	2,599 96				45 25	2,645 21	7,360 25
	Ontario	9,182 02	715 96	823 25	662 35	486 60	11,870 18	14,190 25
Montreal	Aubin, A. O'Flaherty, M. J.	2,199 84	370 00	240 00	92 25	118 80	3,020 89	5,523 05
Quebec	LeVasseur, N. Moreau, A.	1,300 00		150 00		3 90	1,453 90	358 00
Sherbrooke	Simpson, A. F	100 00					100 00	36 00
St. Hyacinthe	Benoit, L. V	36 08					36 08	
	Quebec	3,635 92	370 00	390 00	92 25	122 70	4,610 87	5,917 05
Fredericton	Fowler, Jas. D	200 00					200 00	60 25
St. John	Wilson, J. E	1,000 00			68 52	7 38	1,075 90	361 75
	New Brunswick	1,200 00			68 52	7 38	1,275 90	422 00
Halifax	Miller, A. Munro, H. D. Ritchie, A. T.	1,799 92		389 70	432 14	111 35	2,733 11	518 75
Charlottetown	Davy, E	11 66				28 75	40 41	88 00
Winnipeg	Magness, R	200 00		81 00	7 50	37 02	325 52	476 00
Nanaimo	McAloney, J. A	100 00					100 00	108 25
New Westminster	Wolfenden, Wm	100 00					100 00	
Vancouver	Miller, J. E	300 00			28 90	83 23	412 13	267 50
Victoria	Jones, R	200 00				7 55	207 55	185 75
	British Columbia	700 00			28 90	90 78	819 68	561 50

APPENDIX E—*Concluded.*

STATEMENT of Gas Inspection Expenditures and Revenues, &c.—*Concluded.*

RECAPITULATION.

Provinces.	Expenditures.						Revenues.
	Salaries.	Special Assistance.	Rent.	Travelling Expenses.	Sundries.	Totals.	
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Ontario	9,182 02	715 96	823 25	662 35	486 60	11,870 18	14,190 25
Quebec	3,635 92	370 00	390 00	92 25	122 70	4,610 87	5,917 05
New Brunswick	1,200 00			68 52	7 38	1,275 90	422 00
Nova Scotia	1,799 92		389 70	432 14	111 35	2,733 11	518 75
Prince Edward Island	11 66				28 75	40 41	88 00
Manitoba	200 00		81 00	7 50	37 02	325 52	476 00
British Columbia	700 00			28 90	90 78	819 68	561 50
General				33 75	646 62	680 37	
General expenses					384 06	384 06	
Printing					208 49	208 49	
Stationary					106 72	106 72	
Totals	16,729 52	1,085 96	1,683 95	1,325 41	2,230 47	23,055 31	22,173 55

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Barrie—									
July			19·70		0	1			
August			20·01		0	1			
September			19·45		0	1			
October			20 53		0	1			
November			18·30		0	1			
December			20·00		0	1			
January			20 09		0	1			
February			19·41		0	1			
March			20 22		0	1			
April			21·05		0	1			
May			21·55		0	1			
June			19·34		0	1			
					0	12			
Belleville—									
July	20·47	19·68	20·08		0	2			
August	22·49	21·65	22·07		0	2			
September	21·32	19·90	20·57		0	3			
October	21·25	20·58	20 86		0	3			
November	22·94	18·90	20·47		0	2			
December	20·92	19·39	20·17		0	3			
January	20·92	17·19	18·27		0	4			
February	20·24	19·06	19·61		0	3			
March	20·40	17·00	18.45		0	4			
April	21·58	17·20	19·48		0	4			
May	21·94	16·39	19·16		0	2			
June	21·90	18·19	19·99		0	2			
					0	34			
Berlin—									
July			17·58		0	1			
August			17·76		0	1			
September			17·12		0	1			
October			17·62		0	1			
November			16·19		0	1			
December			17·49		0	1			
January			22 50		0	1			
February			21·46		0	1			
March			22·88		0	1			
April			22·47		0	1			
May			20·00		0	1			
June			21·72		0	1			
					0	12			

F.

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									2	0	2	
									2	0	2	
									3	0	3	
									3	0	3	
									2	0	2	
									3	0	3	
									4	0	4	
									3	0	3	
									4	0	4	
									4	0	4	
									2	0	2	
									2	0	2	
									34	0	34	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Brantford—									
July			20·06		0	1			
August			20·40		0	1			
September			19·73		0	1			
October			20·16		0	1			
November			19·01		0	1			
December			18·50		0	1			
January			19·28		0	1			
February			19·92		0	1			
March			18·79		0	1			
April			19·95		0	1			
May			20·18		0	1			
June			18·66		0	1			
					0	12			
Brockville—									
July			20·00		0	1			
August			20·00		0	1			
September			19·86		0	1			
October			20·06		0	1			
November			20·88		0	1			
December			19·71		0	1			
January			19·00		0	1			
February			17 70		0	1			
March			18·84		0	1			
April			19·77		0	1			
May			20·00		0	1			
June			19·86		0	1			
					0	12			
Chatham—									
July			18·14		0	1			
August			17·54		0	1			
September			16·53		0	1			
October			17·78		0	1			
November			16·67		0	1			
December			16 05		0	1			
January			16·01		0	1			
February			16·22		0	1			
March			17·00		0	1			
April			16·02		0	1			
May			19·06		0	1			
June			18·45		0	1			
					0	12			

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Cobourg—									
July			18·80		0	1			
August			19·97		0	1			
September			19·08		0	1			
October			18·16		0	1			
November			19·01		0	1			
December			19·11		0	1			
January			17·35		0	1			
February			17·01		0	1			
March			18·59		0	1			
April			17·78		0	1			
May			17·76		0	1			
June			17·65		0	1			
					0	12			
Cornwall—									
July			18·10		0	1			
August			18·10		0	1			
September			18·10		0	1			
October			18·40		0	1			
November			18.10		0	1			
December			18·00		0	1			
January			18·10		0	1			
February			18·30		0	1			
March			17·80		0	1			
April			17·80		0	1			
May			18·10		0	1			
June			18·00		0	1			
					0	12			
Deseronto—									
July			21·30		0	1			
August			20·90		0	1			
September			17·10		0	1			
October			22·30		0	1			
November			18·50		0	1			
December									
January									
February			22·80		0	1			
March									
April			24·90		0	1			
May									
June			23·33		0	1			
					0	8			

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									2	0	2	
									2	0	2	
									1	1	2	
									2	0	2	
									2	0	2	
									1	1	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	1	3	
									2	0	2	
									22	3	25	
									1	0	1	
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									1	0	1	
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									1	0	1	
									6	2	8	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Dundas—									
July				20·04	0	1			
August				19·28	0	1			
September				18·84	0	1			
October				19·80	0	1			
November				19·66	0	1			
December				19·68	0	1			
January				19·18	0	1			
February				19·34	0	1			
March				19·01	0	1			
April				19·89	0	1			
May				19·34	0	1			
June				19·13	0	1			
					0	12			
Galt—									
July				20·22	0	1			
August				19·00	0	1			
September				18·00	0	1			
October				22·02	0	1			
November				20·20	0	1			
December				18·10	0	1			
January				19·82	0	1			
February				18·64	0	1			
March				18·02	0	1			
April				19·02	0	1			
May				20·00	0	1			
June				21 07	0	1			
					0	12			
Guelph—									
July				18·12	0	1			
August				17·02	0	1			
September				17·54	0	1			
October				17·00	0	1			
November				17·40	0	1			
December				16·07	0	1			
January				16·87	0	1			
February				19·38	0	1			
March				18·71	0	1			
April				18·16	0	1			
May				18·33	0	1			
June				18·72	0	1			
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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									1	0	1	
									1	0	1	
									1	0	1	
									3	1	4	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									14	1	15	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Surplus per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below standard.	No. of Tests.	Highest	Lowest	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Hamilton—									
July			17·79		0	1			
August			18·06		0	1			
September			17·73		0	1			
October			17·85		0	1			
November			18·20		0	1			
December			18·00		0	1			
January			18·15		0	1			
February			18·50		0	1			
March			18·00		0	1			
April			17·74		0	1			
May			17·93		0	1			
June			18·01		0	1			
					0	12			
Ingersoll—									
July			16·02		0	1			
August			20·41		0	1			
September			16·51		0	1			
October			21·85		0	1			
November			19·22		0	1			
December			19·05		0	1			
January			17·77		0	1			
February			16·02		0	1			
March			18·28		0	1			
April			17·15		0	1			
May			22·72		0	1			
June			23·44		0	1			
					0	12			
Kingston—									
July			21·22		0	1			
August	21·90	21·22	21·56		0	2			
September	21·20	20·90	21·05		0	2			
October			21·60		0	1			
November	22·13	20·52	21·32		0	2			
December	22·48	22·10	22·29		0	2			
January	22·50	22·40	22·45		0	2			
February	22·72	22·24	22·48		0	2			
March			22·60		0	1			
April	22·66	22·54	22·60		0	2			
May	22 10	21·70	21·90		0	2			
June	22·10	21·40	21·75		0	2			
					0	21			

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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									2	0	2	
									1	0	1	
									2	0	2	
									2	0	2	
									2	0	2	
									21	0	21	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Surplus per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below standard.	No. of Tests.	Highest	Lowest	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Listowel—									
July			20·60		0	1			
August			21·95		0	1			
September			22·16		0	1			
October			22·55		0	1			
November			21·55		0	1			
December			22·55		0	1			
January			18 45		0	1			
February			17·69		0	1			
March			20·49		0	1			
April			21·78		0	1			
May			22·63		0	1			
June			21·65		0	1			
					0	12			
London—									
July			21·06		0	1			
August			18·40		0	1			
September			19·19		0	1			
October	18·48	16·25	17·36		0	2			
November			18·43		0	1			
December	18·46	17·97	18·21		0	2			
January	17·51	16·75	17·13		0	2			
February			18·09		0	1			
March	16·89	16·78	16·83		0	2			
April	17·46	16·76	17·11		0	2			
May	18·99	17·30	18·14		0	2			
June	17·34	16·08	16·66		0	2			
					0	19			
Napanee—									
July			22·81		0	1			
August									
September			22·06		0	1			
October									
November			24·31		0	1			
December			20·94		0	1			
January			21·62		0	1			
February			21·62		0	1			
March			20·26		0	1			
April			22·42		0	1			
May			23·27		0	1			
June			21·94		0	1			
					0	10			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
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									10	0	10	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of time below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Ottawa—									
July	21·90	21·86	21·88		0	2	15·08	14·19	14·63
August	22·09	21·70	21·89		0	2	14·88	14·88	14·73
September	21·55	21·54	21·54		0	2	15·48	15·48	15·28
October	21·56	21·52	21·54		0	2	15·37	15·37	15·11
November	21·37	20·56	21·46		0	2	14·92	14·41	14·66
December	22·07	21·59	21·83		0	2	14·99	14·73	14·86
January	22·33	21·55	21·94		0	2	17·63	14·97	16·30
February	22·01	21·90	21·95		0	2	15·29	14·70	14·99
March	22·93	21·45	22·19		0	2	15·19	14·41	14·79
April	21·63	21·46	21·54		0	2	15·29	14·64	14·96
May	21·58	21·41	21·49		0	2	14·92	14·54	14·73
June	21·75	21·61	21·68		0	2	14·75	14·47	14·61
					0	24			
Owen Sound—									
July			21·76		0	1			
August			21·60		0	1			
September			21·60		0	1			
October			22·10		0	1			
November			22·13		0	1			
December			22·40		0	1			
January			22·70		0	1			
February			21·07		0	1			
March			22·54		0	1			
April			22·07		0	1			
May			22·00		0	1			
June			22·12		0	1			
					0	12			
Peterborough—									
July			21·77		0	1			
August			24·97		0	1			
September			21·00		0	1			
October			19·31		0	1			
November			24·00		0	1			
December			18·87		0	1			
January			17·19		0	1			
February									
March			25·00		0	1			
April	20·00	18·34	19·17		0	2			
May			23·00		0	1			
June			21·00		0	1			
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
	0	2							2	0	2	
	0	2							1	0	1	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	2							2	0	2	
	0	24							23	0	23	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									2	0	2	
									1	0	1	
									12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Port Hope—									
July			18·28		0	1			
August			19·52		0	1			
September			19·11		0	1			
October			17·49		0	1			
November			18·01		0	1			
December			17·25		0	1			
January			17·73		0	1			
February			19·67		5	1			
March			17·94		0	1			
April			17·66		0	1			
May			19·24		0	1			
June			18·29		0	1			
					0	12			
Sarnia—									
July			19·80		0	1			
August			21·04		0	1			
September			19·14		0	1			
October			21·32		0	1			
November			19·76		0	1			
December			20·36		0	1			
January			19·38		0	1			
February			19·38		0	1			
March			19·92		0	1			
April			19·26		0	1			
May			20·56		0	1			
June			18 40		0	1			
					0	12			
Stratford—									
July			16·61		0	1			
August			16·22		0	1			
September			16·41		0	1			
October			16·76		0	1			
November			16·76		0	1			
December			16·95		0	1			
January			16·70		0	1			
February			15 06		1	1			
March			15 86		1	1			
April			17·17		0	1			
May			16·61		0	1			
June			16·79		0	1			
					2	12			

F —*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									2	0	2	
									24	0	24	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

RETURN of the Illuminating Power and Purity of Gas

INSPECTION OFFICES.	ILLUMINATING POWER.						SULPHUR PER 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
St. Catharines—									
July			19·60		0	1			
August			19 44		0	1			
September			19·28		1	1			
October			19·50		0	1			
November			20·30		0	1			
December			19·98		0	1			
January			19.50		0	1			
February			20·07		0	1			
March			19·84		0	1			
April			20·07		0	1			
May			20·08		0	1			
June			18·28		0	1			
					1	12			
St. Thomas—									
July			16·52		0	1			
August			16 29		0	1			
September	16·48	14·35	15·65		1	3			
October			16·56		0	1			
November			16·04		0	1			
December			16·00		0	1			
January			17·19		0	1			
February			16·11		0	1			
March			16·10		0	1			
April			16·03		0	1			
May			17·95		0	1			
June			17·08		0	1			
					1	14			
Toronto—									
July	20·79	20·12	20·52		0	8	11·12	9·87	10·54
August	21·04	19·44	20·35		0	9	10·07	8·61	9·34
September	21·24	19·91	20·44		0	9	14·58	8·96	11·77
October	21·56	20·13	20·80		0	9	15·58	14·08	14·83
November	21·68	20·56	20·91		0	8	11·21	9·81	10·51
December	21·76	20·32	20·86		0	9	15·67	13·06	14·36
January	20·86	19·67	20·21		0	9	12·91	8·70	10·80
February	20·69	18·75	19·58		0	8	11·16	9 89	10·52
March	21·12	18·70	19·60		0	9	16·99	16·11	16·55
April	20·32	18·67	19 36		0	9	15·89	14·19	15·89
May	19·91	18 77	19·47		0	8	11·35	9·15	10·25
June	20·61	19·40	19·84		0	9	17·64	13·85	15·74
					0	104			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									3	0	3	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									14	0	14	
	0	2	0·05	0·03	0·04		0	2	8	0	8	
	0	2	0·31	0·26	0·28		0	2	9	0	9	
	0	2	0·10	0·00	0·05		0	2	9	0	9	
	0	2	1·74	0·51	1·12		0	2	9	0	9	
	0	2	0·76	0·04	0·40		0	2	8	0	8	
	0	2	0·95	0·62	0·78		0	2	9	0	9	
	0	2	0·84	0·47	0·65		0	2	9	0	9	
	0	2	0·90	0·50	0·70		0	2	8	0	8	
	0	2	0·52	0·30	0·41		0	2	9	0	9	
	0	2	0·04	0·00	0·02		0	2	9	0	9	
	0	2	0·06	0·04	0·05		0	2	8	0	8	
	0	2	1·31	0·90	1·10		0	2	9	0	9	
	0	24					0	24	104	0	104	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Windsor—									
July			17·72		0	1			
August			16·58		0	1			
September			17·99		0	1			
October	17·97	16·40	16·68		0	2			
November			16·77		0	1			
December			13 60		1	1			
January			18·32		0	1			
February			18·60		0	1			
March			17·12		0	1			
April			18·80		0	1			
May			17·61		0	1			
June			17·84		0	1			
					1	13			
Woodstock—									
July			21·07		0	1			
August			19·82		0	1			
September			26·58		0	1			
October			17·44		0	1			
November			22·92		0	1			
December			22·87		0	1			
January			19·62		0	1			
February			26·37		0	1			
March			24·41		0	1			
April			25·12		0	1			
May			23·81		0	1			
June			22·95		0	1			
					0	12			
Montreal—									
July	21·16	18·14	19·52		0	8	26·43	20·79	23·61
August	20·12	19·38	19·97		0	9	28·63	28·63	22·64
September	21·51	18·11	19·61		0	9	30·56	30.56	29·79
October	21·08	18·33	19·67		0	9	27·41	27·41	23·80
November	19·48	17·24	18·56		0	8	23·70	22·86	23·28
December	20·74	17·46	19·08		0	9	21·46	19·77	20·61
January	18·48	16·80	17·75		0	9	11·40	10·31	10·85
February	18·84	17·03	17·65		0	7	14·49	12 14	13·31
March	19·01	16·68	17 97		0	9	17·39	14·41	15·90
April	18·97	16·75	17·78		0	9	33·83	32·93	33·28
May	21·85	19·02	20·66		0	8	24·83	17·02	20·92
June	21·14	18·19	19 55		0	8	29·49	18·16	23·82
					0	102			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									2	0	2	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									13	0	13	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
	0	2	2·17	1·80	1·98		0	2	11	0	11	
	0	2	1·01	0·00	0·50		0	2	12	0	12	
	0	2			0·00		0	2	12	0	12	
	0	2			0·00		0	2	12	0	12	
	0	2			0·00		0	2	11	0	11	
	0	2			0·00		0	2	12	0	12	
	0	2			0·00		0	2	12	0	12	
	0	2			0·00		0	2	10	0	10	
	0	2			0·00		0	2	12	0	12	
	0	2			0·00		0	2	12	0	12	
	0	2			0·00		0	2	11	0	11	
	0	2			0·00		0	2	11	0	11	
	0	24					0	24	138	0	138	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Quebec—									
July			18·24		0	1	17·53	17·02	17·27
August			17·95		0	1	20·70	16·91	18·80
September			18·16		0	1	20·34	20·11	20·22
October			17·66		0	1	18·09	14·18	16·13
November			18·52		0	1	21·25	20·64	20·94
December			18·17		0	1	22·24	20·07	21·15
January			17·90		0	1	20·14	16·97	18·55
February			17·92		0	1	20·86	20·23	20·54
March			18·00		0	1	19·73	18·48	19·10
April			18·56		0	1	21·28	19·96	20·62
May			17·68		0	1	20·22	14·36	17·25
June			17·30		0	1	15·32	12·44	13·88
					0	12			
Sherbrooke—									
July			16·68		0	1			
August			17·06		0	1			
September			17·24		0	1			
October			17·55		0	1			
November			17·29		0	1			
December			16·33		0	1			
January			16·33		0	1			
February			15·22		1	1			
March			13·82		1	1			
April			16·19		0	1			
May			16·51		0	1			
June			17·24		0	1			
					2	12			
Fredericton—									
July	18·07	17·03	17·57		0	5			
August	18·31	17·42	17·95		0	5			
September	18·33	17·48	17·74		0	4			
October	18·44	17·35	17·81		0	4			
November	18·49	17·88	18·13		0	5			
December	18·42	16·48	17·69		0	5			
January	18·90	17·09	18·19		0	5			
February	17·93	16·31	16·99		0	5			
March	17·18	16·40	16·66		0	5			
April	16·67	15·99	16·29		1	3			
May	17·25	16·29	16·74		0	4			
June	16·86	16·31	16·64		0	5			
					1	55			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	2					0	2	2	0	2	
	0	24					0	24	24	0	24	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									5	0	5	
									5	0	5	
									4	0	4	
									4	0	4	
									5	0	5	
									5	0	5	
									5	0	5	
									5	0	5	
									5	0	5	
									3	0	3	
									4	0	4	
									5	0	5	
									55	0	55	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Moncton—									
July									
August									
September									
October			17·97		0	1			
November			17·94		0	1			
December			16·97		0	1			
January			16·77		0	1			
February			16·00		0	1			
March			18·57		0	1			
April			16·18		0	1			
May			17·75		0	1			
June			17·79		0	1			
					0	9			
St. John—									
July									
August									
September									
October	16·50	16·40	16·45		0	2			23·18
November	16·47	15·86	16·19		1	5	29·03	15·42	24·03
December	18·56	16·40	17·09		0	6	20·06	17·37	18·98
January	18·72	16·75	17·70		0	6	24·16	23·01	23·58
February	17·67	16·48	17·18		0	6	19·33	18·09	18·71
March	17·39	16·25	16·81		0	5	27·38	20·15	23·76
April	17·38	16·47	16·97		0	6	25·11	16·64	20·87
May	17·60	17·05	17·27		0	6	27·76	22·70	25·23
June	16·81	16·39	16·61		0	5	20·67	13·85	17·26
					1	47			
Halifax—									
July			17·51		0	1			13·73
August			17·05		0	1			
September			17·64		0	1			
October			17·80		0	1			11·90
November			16·20		0	1			10·69
December			17·40		0	1			10·77
January			16·88		0	1			11 61
February			16·61		0	1			10·11
March			17·22		0	1			11·08
April			16·35		0	1			9·88
May			17·37		0	1			8·90
June			17·49		0	1			11·61
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									9	0	9	
	0	1			3·73		0	1	3	0	3	
	0	4	3·14	1·43	2·14		0	4	5	0	5	
	0	2	1·63	0·56	1·09		0	2	6	0	6	
	0	2	1·04	1·01	1·02		0	2	6	0	6	
	0	2	0·56	0·00	0·28		0	2	6	0	6	
	0	2	0·51	0·00	0·25		0	2	5	0	5	
	0	2	1·51	1·27	1·39		0	2	6	0	6	
	0	2	0·77	0·51	0·64		0	2	6	0	6	
	0	2	2·04	1·26	1·65		0	2	5	0	5	
	0	19					0	19	48	0	48	
	0	1					0	1	1	0	1	
									1	0	1	
									1	0	1	
	0	1							1	0	1	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	1					0	1	1	0	1	
	0	10					0	9	12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Pictou—									
July			18·81		0	1			
August			18·20		0	1			
September			18·00		0	1			
October									
November			18·63		0	1			
December			18·63		0	1			
January			18·08		0	1			
February			18·09		0	1			
March			18·15		0	1			
April			18·33		0	1			
May									
June			18·10		0	1			
					0	10			
Yarmouth—									
July			17·42		0	1			
August			16·75		0	1			
September			17·15		0	1			
October			16·81		0	1			
November			17·51		0	1			
December			17·51		0	1			
January			16.60		0	1			
February			17·00		0	1			
March			17·14		0	1			
April									
May									
June			17·05		0	1			
					0	10			
Charlottetown—									
July			17·56		0	1			
August			18·45		0	1			
September			17·41		0	1			
October			21·44		0	1			
November			18·30		0	1			
December			19·40		0	1			
January			19·70		0	1			
February			19·42		0	1			
March			21·13		0	1			
April			19·97		0	1			
May			19·81		0	1			
June			19 79		0	1			
					0	12			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									10	0	10	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									10	0	10	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Winnipeg—									
July			22·28		0	1			
August			22·00		0	1			
September			20·52		0	1			
October			20·21		0	1			
November			19·82		0	1			
December			20·08		0	1			
January			21·10		0	1			
February			20·04		0	1			
March			20·62		0	1			
April			21·11		0	1			
May			19·94		0	1			
June			19·95		0	1			
					0	12			
Nanaimo—									
July			19·04		0	1			
August			18·29		0	1			
September			19·72		0	1			
October			18·72		0	1			
November			19·21		0	1			
December			18·48		0	1			
January			18·21		0	1			
February			17·85		0	1			
March			17·59		0	1			
April			19·34		0	1			
May			18·66		0	1			
June			19·10		0	1			
					0	12			
New Westminster—									
July						Nil			
August						"			
September						"			
October						"			
November						"			
December						"			
January						"			
February						"			
March						"			
April						"			
May						"			
June						"			
						"			

SESSIONAL PAPER No. 13

F—*Continued.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen.			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests.	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
											Nil	
											"	
											"	
											"	
											"	
											"	
											"	
											"	
											"	
											"	
											"	

APPENDIX

Return of the Illuminating Power and Purity of Gas

Inspection Offices.	Illuminating Power.						Sulphur per 100		
	Highest.	Lowest.	Average.	Standard.	No. of times below Standard.	No. of Tests.	Highest	Lowest.	Average
	Candles.	Candles.	Candles.	16 Candles.			Grains.	Grains.	Grains.
Vancouver—									
July			18·42		0	1			
August			17·44		0	1			
September			18·23		0	1			
October			17·89		0	1			
November			18·68		0	1			
December			18·36		0	1			
January			18·48		0	1			
February			18·26		0	1			
March			18·15		0	1			
April			18·23		0	1			
May			18·23		0	1			
June			18·42		0	1			
					0	12			
Victoria—									
July			18·38		0	1			
August			18·10		0	1			
September									
October			18·07		0	1			
November			18·02		0	1			
December			18·10		0	1			
January			18·24		0	1			
February			18·11		0	1			
March			17·94		0	1			
April			18·44		0	1			
May			18·77		0	1			
June			18·02		0	1			
					0	11			

Inland Revenue Department,
Ottawa, August 10, 1901.

SESSIONAL PAPER No. 13

F—*Concluded.*

Inspected during the Year ended June 30, 1901.

Cubic Feet.			Ammonia per 100 Cubic Feet.						Sulphuretted Hydrogen			Remarks.
Standard.	No. of times in excess of allowance.	No. of Tests.	Highest	Lowest.	Average	Standard.	No. of times in excess of allowance.	No. of Tests.	No. of times absent.	No. of times present.	No. of Tests	
35 Grains.			Grains.	Grains.	Grains.	4 Grains.						
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									12	0	12	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									1	0	1	
									11	0	11	

W. J. GERALD,
Deputy Minister.

APPENDIX G.

STATEMENT of Gas Meters presented for Verification, Verified, Verified after first Rejection, and Rejected, during the Year ended June 30, 1901.

INSPECTION OFFICES.	Presented for Verification	Kind.		Verified as coming within the Error tolerated by Law.			Verified after First Rejection.			Rejected.			Totals. Verified and Rejected.	
		Wet.	Dry.	Correct.	Fast.	Slow.	Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Verified.	Rejected.
Barrie	22	....	22	....	10	11	....	....	....	....	....	1	21	1
Belleville	74	....	74	12	33	22	....	....	....	4	3	....	67	7
Berlin	130	....	130	3	59	55	....	1	1	....	6	5	119	11
Brockville	236	....	236	55	111	60	....	3	1	1	2	3	230	6
Cobourg	43	....	43	4	8	29	....	....	1	....	....	1	42	1
Cornwall	4	....	4	....	1	3	....	....	....	....	....	....	4	....
Guelph	232	....	232	5	71	156	....	....	....	....	....	....	232	....
Hamilton	1,415	....	1,415	237	121	1,056	....	....	....	....	1	....	1,414	1
Kingston	229	....	229	82	29	117	....	....	....	....	....	1	228	1
Listowel	34	....	34	11	8	14	....	....	....	....	....	1	33	1
London	1,837	....	1,837	376	337	1,108	....	2	....	....	13	1	1,823	14
Napanee	29	....	29	9	7	10	....	....	....	....	2	1	26	3
Ottawa	537	1	536	28	56	450	....	....	....	....	1	2	534	3
Owen Sound	22	....	22	20	1	1	....	....	....	....	....	....	22	....
Peterborough	42	15	27	15	27	....	....	....	....	....	....	....	42	....
Sarnia	175	44	131	146	5	5	5	....	8	....	....	6	169	6
Stratford	37	....	37	3	11	19	....	....	....	....	2	2	33	4
Toronto	6,928	....	6,928	1,041	1,777	4,077	....	....	....	14	16	3	6,895	33
Montreal	5,650	....	5,650	651	761	4,197	....	....	....	2	33	6	5,609	41
Quebec	173	....	173	29	41	100	....	1	....	1	1	....	171	2
Sherbrooke	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fredericton	32	....	32	21	5	4	....	1	....	....	....	1	31	1
St. John	222	....	222	55	18	145	....	....	....	....	3	1	218	4
Halifax	257	174	83	170	31	55	....	....	....	....	1	....	256	1
Charlottetown	53	....	53	9	7	18	....	....	....	11	....	8	34	19
Winnipeg	421	....	421	35	7	379	....	....	....	....	....	....	421	....
Nanaimo	79	....	79	8	14	56	....	....	....	1	....	....	78	1
Vancouver	232	....	232	51	94	87	....	....	....	....	....	....	232	....
Victoria	153	....	153	36	42	75	....	....	....	....	....	....	153	....
Totals	19,298	234	19,064	3,112	3,692	12,309	5	8	11	34	84	43	19,137	161

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX H.

STATEMENT of Electric Light Inspection Expenditures and Revenues for the Year ended June 30, 1901.

Districts.	Inspectors.	Expenditures.					Revenues.	
		Special Assistance	Rent.	Travelling Expenses.	Sundries.	Totals.	Registration Fees.	Inspection Fees.
		$ cts.	$ cts.		$ cts.	$ cts.	$ cts.	$ cts.
Belleville	Johnson, Wm			169 91	17 17	187 08	545 00	243 25
Hamilton	McPhie, D.			86 50	1 15	87 65	365 00	821 75
London	Nash, A. F.			97 00	4 00	101 00	680 00	581 75
Ottawa	Roche, H. G.						380 00	735 50
Toronto	Johnstone, J. K.			140 80	8 45	149 25	935 00	1,573 00
	Ontario			494 21	30 77	524 98	2,905 00	3,955 25
Montreal	Aubin, A	360 00		19 50	9 75	389 25	310 00	2,728 75
Quebec	LeVasseur, N				63 64	63 64	132 50	1,213 50
Sherbrooke	Simpson, A. F.			74 45	2 14	76 59	340 00	237 00
	Quebec	360 00		93 95	75 53	529 48	782 50	4,179 25
St. John	Wilson, J. R.			102 54	17 80	120 34	185 00	562 75
Halifax	Miller, A.			142 84	3 75	146 59	375 00	372 75
Winnipeg	Magness, R		27 00	162 00	8 75	197 75	275 00	428 77
Vancouver	Miller, J. E.						215 00	769 00
Victoria	Jones, R.			14 50	3 45	17 95	60 00	297 75
	British Columbia			14 50	3 45	17 95	275 00	1,066 75

RECAPITULATION.

	Salaries.							
Ontario				494 21	30 77	524 98	2,905 00	3,955 25
Quebec		360 00		93 95	75 53	529 48	782 50	4,179 25
New Brunswick				102 54	17 80	120 34	185 00	562 75
Nova Scotia and P.E.I				142 84	3 75	146 59	375 00	372 75
Manitoba			27 00	162 00	8 75	197 75	275 00	428 77
British Columbia				14 50	3 45	17 95	275 00	1,066 75
Chief Electrical Engr.	2,400 00	30 00		463 17	106 30	2,999 47		
General					4,199 26	4,199 26		
Printing					7 35	7 35		
Stationery					16 20	16 20		
Totals	2,400 00	390 00	27 00	1,473 27	4,469 16	8,759 37	4,797 50	10,565 52

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX I.

STATEMENT showing the number of Electric Light Meters Verified, Rejected, and Verified after first Rejection, in each Inspection District, for the Fiscal Year ended June 30, 1901.

DISTRICTS.	Number presented.	Verified as coming within the Error tolerated by Law.			Rejected.			Verified after first rejection as coming within the Error tolerated by Law.		
		Correct.	Fast.	Slow.	Unsound.	Fast.	Slow.	Correct.	Fast.	Slow.
Belleville	205	140	37	28						
Hamilton	578	464	42	72						
London	426	100	177	145		1	2	1		
Ottawa	809	86	249	462	6	2	4			
Toronto	761	106	282	176		2		62	55	78
Montreal	2,212	1,209	671	196	47	6	10	2	66	5
Quebec	1,633	561	574	492	2			1		
Sherbrooke	139	30	54	55						
St. John	398	73	205	120						
Halifax	458	308	97	16	2	23	4	5	2	1
Winnipeg	264	74	45	145						
Vancouver	691	226	177	288						
Victoria	349	98	149	102						
Totals	8,923	3,478	2,759	2,297	57	34	20	71	123	84

W. J. GERALD,
Deputy Minister.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

APPENDIX J.

STATEMENT showing the Electric light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1901.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps. Arc.	Incandescent.	Totals.	Registration Fees.	Totals.
								$ cts.	$ cts.
Belleville. ...	Corporation of the Town of Pictou	1	C. I. R., Belleville	1900–1901	50	2,000	2,500	25 00	
	R. R. Casement & Co., Madoc	2	" "	"	.....	400	400	10 00	
	Pratt, Patching & Co., Tweed	3	" "	"	.....	650	650	10 00	
	Belleville Gas Co	4	" "	"	57	.....	570	10 00	
	Trenton Electric and Water Co., Ltd	5	" "	"	92	3,000	3,920	25 00	
	Marmora Electric Co. *	6	" "	"	..	250	250	5 00	
	Vankleek Hill Electric Co., Ltd	1	" Cornwall	"	.....	865	865	10 00	
	Municipal Corporation of the Village of Alexandria	2	" "	"	.....	859	859	10 00	
	Stormont Electric Light and Power Co., Cornwall	3	" "	"	.....	1,400	1,400	25 00	
	Kingston Light, Heat and Power Co.	1	Kingston	"	115	2,500	3,650	25 00	
	Napanee Water and Electric Light Co., Limited	2	" "	"	24	850	1,090	25 00	
	Standard Electric Light Co., Napanee	3	" "	"	.....	2,100	2,100	25 00	
	Benjamin Manufacturing Co., of Yarker, Limited	4	" "	"	.....	210	210	10 00	
	A. A. Connelly, Yarker	5	" "	"	.....	85	85	10 00	
	Lakefield Electric Light Co	1	" Peterborough	"	40	.....	400	10 00	
	Fenelon Falls Electric Light Co., Ltd	2	" "	"	.....	600	600	10 00	
	Port Hope Electric Light and Power Co., Ltd	3	" "	"	39	900	1,290	25 00	
	Cobourg Water and Electric Co., Ltd	4	" "	"	2	1,200	1,450	25 00	
	James A. Spence, Colborne	5	" "	"	20	480	680	10 00	
	H. W. Foulds & Co., Hastings	6	" "	"	12	375	495	10 00	
	Peterborough Light and Power Co., Ltd	7	" "	"	120	7,000	8,200	25 00	
	W. C. Harrison, Norwood	8	" "	"	15	380	530	10 00	
	Light, Heat and Power Co., of Lindsay	9	" "	"	60	7,000	7,600	25 00	
	Bowmanville Electric Light Co., Ltd	10	" "	"	24	705	945	10 00	
	H. R. Carruthers, Millbrook	11	" "	"	10	120	220	10 00	
	Waterworks and Electric Light Commission of Campbellford	12	" "	"	36	1,282	1,642	25 00	
	D. J. Galbraith, Newcastle	13	" "	"	.....	300	300	10 00	
	Cardinal Electric Light Co., Ltd	1	" Prescott	"	....	700	700	10 00	
	Kemptville Electric Light Co	2	" "	"	....	500	500	10 00	
	A. H. Merkley, Morrisburgh	3	" "	"	.....	850	850	10 00	
	Merrickville Electric Light and Power Co.	4	" "	"	.....	350	350	10 00	

* Registered for half a year, from January 1, 1901.

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1901.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Belleville. . .	Brockville Light and Power Co., Ltd	5	C. I. R. Hamilton	1900–1901.	35	1,700	2,050	25 00	
	Electric Light and Water Works Commissioners of Prescott	6	" "	"	16	1,557	1,717	25 00	
	Gananoque Electric Light and Water Supply Co	7	" "	"	21	1,000	1,210	25 00	
									545 00
Hamilton . . .	Simcoe Gas and Water Co	1	" Brantford	"	29		290	10 00	
	H. Webster, Norwich	2	" "	"		495	495	10 00	
	Tilsonburg Electric Light Works	3	" "	"	11	830	940	10 00	
	James Munro, Embro	4	" "	"		410	410	10 00	
	Woodstock Electric Light and Street Railway Co., Ltd	5	" "	"	70	1,200	1,900	25 00	
	Port Rowan Electric Light Supply	6	" "	"	12	135	255	10 00	
	Brantford Street Railway Co	8	" "	"		2,715	2,715	25 00	
	Ingersoll Electric Power and Light Co., Ltd	8	" "	"	36	1,040	1,400	25 00	
	Port Dover Electric Light Syndicate	9	" "	"		350	350	10 00	
	Brantford Electric and Operating Co., Ltd	10	" "	"	200	5,500	7,500	25 00	
	Paris Electric Light Co., Ltd	11	" "	"	40	500	900	10 00	
	Hamilton Electric Light and Power Co., Ltd	1	" Hamilton	"	554	20,000	25,540	25 00	
	Hamilton Electric Light and Cataract Power Co., Ltd	2	" "	"		200	200	10 00	
	Electric Power and Manufacturing Co., Ltd., Hamilton	3	" "	"		200	200	10 00	
	Dundas Electric Co., Ltd	4	" "	"	6	895	955	10 00	
	Corporation of the Town of Niagara	1	" St. Catharines	"		800	800	10 00	
	Corporation of the Town of Thorold	2	" "	"	30	587	887	10 00	
	St. Catharines Electric Light and Power Co., Limited	3	" "	"	75	2,500	3,250	25 00	
	Maple Leaf Rubber Co., Ltd., Port Dalhousie	4	" "	"	22	600	820	10 00	
	Dunnville Electric Light Co., Ltd	5	" "	"	18	914	1,094	25 00	
	J. W. Van Dyke, Grimsby	6	" "	"		750	750	10 00	
	Welland Electric Light Co	7	" "	"	18	250	430	10 00	
	Ontario Electric Light and Power Co., Beamsville	8	" "	"		250	250	10 00	
	Merritton Electric Light Co	9	" "	"	21	775	996	10 00	
	Wm. Cooke, St. Catharines	10	" "	"		900	900	10 00	
	Maple Leaf Rubber Co., Ltd., Port Dalhousie	1	" "	1901–1902.	15	306	456	10 00	
									365 00
London	London Electric Co., Ltd	1	" London	1900–1901.	350	17,180	20,680	25 00	
	St. Thomas Gas Co	2	" "	"	105	2,060	3,050	25 00	

	Sarnia Gas and Electric Light Co.	3	"	"	"	65	750	1,400	25 00		
	Petrolia Electric Light, Heat and Power Co., Ltd.	4	"	"	"	41	2,000	2,410	25 00		
	Cook & Sons, Lucan	5	"	"	"	..	350	350	10 00		
	John Morwood, Alvinston	6	"	"	"	13	270	400	10 00		
	Hamilton & Prout, Forest	7	"	"	"	12	500	620	10 00		
	Strathroy Electric Co., Ltd.	8	"	"	"	20	600	800	10 00		
	Fitzgerald & Sauermann, Watford	9	"	"	"	12	290	410	10 00		
	Bella A. Gordon, Glencoe	10	"	"	"	24	300	540	10 00		
	Dutton Electric Light Co., Ltd.	11	"	"	"	4	376	416	10 00		
	H. C. Baird & Son, Parkhill	12	"	"	"	7	400	470	10 00		
	Aylmer Electric and Manufacturing Co., Ltd.	13	"	"	"	12	800	920	10 00		
	West Lorne Electric Light Co., Ltd	14	"	"	"	6	144	204	10 00		
	Palmerston Electric Light Co	1	"	Stratford..	"	4	600	640	10 00		
	St. Mary's Electric Light Co.	2	"	"	"	13	750	880	10 00		
	Clinton Electric Light Co.	3	"	"	"	14	650	790	10 00		
	J. G. Field, Tavistock	4	"	"	"	. ...	575	575	10 00		
	Jacob L. Eidt, Auburn	5	"	"	"	.....	80	80	10 00		
	Wingham Electric Light Co.	6	"	"	"	40	1,200	1,660	25 00		
	Corporation of the Town of Mitchell	7	"	"	"	36	550	910	10 00		
	J. A. Williams & Co., Zurich	8	"	"	"	.....	200	200	10 00		
	Exeter Electric Light and Power Co., Ltd.	9	"	"	"	10	800	900	10 00		
	Seaforth Electric Light, Heat and Power Co , Ltd	10	"	"	"	55	1,450	2,000	25 00		
	Cook & Sons, Hensall	11	"	"	"	1	500	510	10 00		
	Town of Goderich..	12	"	"	"	33	1,800	2,130	25 00		
	Gaedke & Ries, Wroxeter	13	"	"	"	.....	300	300	10 00		
	Stratford Gas Co.	14	"	"	"	100	2,000	3,000	25 00		
	Brussels Electric Light Co.	15	"	"	"	9	350	440	10 00		
	Blyth Electric Light Plant	16	"	"	"	12	400	520	10 00		
	John C. Hay, Listowel	17	"	"	"	23	..	230	10 00		
	Corporation of the Town of St. Mary's	18	"	"	"	40	1,500	1,900	25 00		
	People's Electric Co., Ltd., Windsor	1	"	Windsor ..	"	1	4,720	4,730	25 00		
	Hiram Walker & Sons, Ltd., Walkerville	2	"	"	"	8	2,500	2,580	25 00		
	Geo. Munro, Thamesville	3	"	"	"	.....	500	500	10 00		
	Kingsville Electric Light Co	4	"	"	"	..	700	700	10 00		
	W. H. McMakon, Rigdetown	5	"	"	"	14	606	746	10 00		
	Amherstburg Electric Light, Heat and Power Co., Ltd.	6	"	"	"	...	930	930	10 00		
	J. E. Gordon, Dresden	7	"	"	"	.....	400	400	10 00		
	Essex Electric Light Co.	8	"	"	"	12	588	708	10 00		
	Corporation of the Town of Bothwell	9	"	"	"	15	280	430	10 00		
	Lewis Goodchild, Harrow	10	"	"	"	.....	350	350	10 00		
	Tilbury Electric Light Plant	11	"	"	"	13	450	580	10 00		
	Leamington Electric Light Co., Ltd	12	"	"	"	17	893	1,063	25 00		
	Chatham Gas Co., Ltd.	13	"	"	"	4	1,500	1,540	25 00		
	Smith & Henderson, Blenheim	14	"	"	"	10	80	180	10 00		
	Wallaceburg Electric Light Co.	15	"	"	"	20	1,000	1,200	25 00		
										680 00	
Ottawa	Albert Maclaren, Buckingham	1	"	Ottawa	"	...	996	996	10 00		
	Deschênes Electric Co., Ltd..	2	"	"	"	.....	1,600	1,600	25 00		
	Ottawa Electric Co.	3	"	"	"	585	80,000	85,850	25 00		
	Hull Electric Co.	4	"	"	"	20	3,580	3,780	25 00		

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1901.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Ottawa	Eganville Star Electric Light and Power Co	1	C. I. R., Perth	1900-1901		500	500	10 00	
	Pakenham Electric Light Co	2	" "	"		350	350	10 00	
	John Bourke, North Bay	3	" "	"	15	1,100	1,250	25 00	
	Mattawa Electric Light and Power Co., Ltd	4	" "	"	2	963	983	10 00	
	Renfrew Electric Co., Ltd	5	" "	"	8	500	580	10 00	
	Pembroke Electric Light Co., Ltd	6	" "	"	22	2,950	3,170	25 00	
	Wm. A Mackay, Rentrew	7	" "	"		990	990	10 00	
	Smith's Falls Electric Power Co	8	" "	"	30	2,000	2,300	25 00	
	Perth Electric Light Co., Ltd	9	" "	"	46		466	10 00	
	Almonte Electric Light Co., Ltd	10	" "	"	16	1,700	1,860	25 00	
	Arnprior Electric Light and Power Co., Ltd	11	" "	"	10	2,500	2,600	25 00	
	Carleton Place Electric Light Co	12	" "	"	28	1,800	2,080	25 00	
	Citizen's Electric Co., Ltd., Smith's Falls	13	" "	"		1,200	1,200	25 00	
	Canadian Electric and Water Power Co., Ltd., Perth	14	" "	"		2,500	2,500	25 00	
	C. Bonfield Electric Co., Eganville	15	" "	"		500	500	10 00	
	Corporation of the Town of Sudbury	16	" "	"	14	1,300	1,400	25 00	
									380 00
Toronto	Howes & Leighton, Harriston	1	" Guelph	"	12	300	420	10 00	
	Galt Gas Light Co., Ltd	2	" "	"	59	581	1,171	25 00	
	Corley & Collins, Mount Forest	3	" "	"	14	800	940	10 00	
	J. S. Shantz, Hespeler	4	" "	"	32	32	352	10 00	
	Wm. C. Shearer, Preston	5	" "	"		400	400	10 00	
	James Fenwick, Preston	6	" "	"	33		330	10 00	
	Guelph Light and Power Co	7	" "	"	100	2,644	3,644	25 00	
	A. Groves, Fergus	8	" "	"	17	700	870	10 00	
	Waterloo Electric Light and Power Co	9	" "	"	20	1,500	1,700	25 00	
	Berlin Gas Co	10	" "	"	46	897	1,357	25 00	
	Adams Bros., Drayton	11	" "	"	5	260	310	10 00	
	Jacob Morley, New Hamburg	12	" "	"	21	325	535	10 00	
	N. Winger & Bros., Ayton	1	" Owen Sound	"		150	150	10 00	
	Bearman & Co., Chesley	2	" "	"	20	700	900	10 00	
	Robert Young, Wiarton	3	" "	"	20	600	800	10 00	
	Thomas Andrews, Thornbury	4	" "	"	9	450	540	10 00	

Joseph Schnitzler, Mildmay	5	"	"	"			180	180	10	00
Teeswater Light and Power Co	6	"	"	"			400	400	10	00
Walter Stewart & Son, Lucknow	7	"	"	"		13	400	530	10	00
H. Genetzner, Hanover	8	"	"	"		16	1,400	1,560	25	00
Paisley Electric Light Co	9	"	"	"			522	522	10	00
Owen Sound Electric, Illuminating and Manufacturing Co., Limited	10	"	"	"		45	475	925	10	00
Kilmer, Crawford & McIntyre, Durham	11	"	"	"			820	820	10	00
Minnis Bros., Markdale	12	"	"	"			600	600	10	00
Walkerton Electric Light and Power Co., Ltd	13	"	"	"		20	1,300	1,500	25	00
Saugeen Electric Light and Power Co., Ltd., Southampton	14	"	"	"			1,300	1,300	25	00
Town of Kincardine	15	"	"	"			940	940	10	00
Corporation of the Town of Collingwood	16	"	"	"		36	2,000	2,360	25	00
W. Moore & Sons, Meaford	17	"	"	"		18	500	680	10	00
Corporation of the Village of Dundalk	18	"	"	"			450	450	10	00
Alexander Dobson, Beaverton	1	"	Toronto	"			510	510	10	00
Aurora Electric Light Co	2	"	"	"		2	450	470	10	00
Oshawa Electric Light Co., Ltd	3	"	"	"		25	600	850	10	00
Knight Bros. Co., Burk's Falls	4	"	"	"			570	570	10	00
Corporation of the Village of Acton	5	"	"	"			688	688	10	00
Toronto Electric Light Co., Ltd	6	"	"	"		1,450	80,000	94,500	25	00
Parry Sound Electric Light Co., Ltd	7	"	"	"		1	1,644	1,654	25	00
Corporation of the Town of Bracebridge	8	"	"	"			3,000	3,000	25	00
Port Perry Electric Light Co	9	"	"	"		12	275	395	10	00
Penetanguishene and Midland Electric Street Railway, Light and Power Company, Ltd	10	"	"	"		14	800	940	10	00
Tottenham Electric Light Plant	11	"	"	"			217	217	10	00
W. H. Summerfeldt & Sons, Sutton West	12	"	"	"			275	275	10	00
Lakefield and Whitby Electric Light Co	13	"	"	"		26	540	800	10	00
Corporation of the Town of Orillia	14	"	"	"		48	2,600	3,080	25	00
Cannington Electric Light Co	15	"	"	"		10	410	510	10	00
Alliston Electric Light Co	16	"	"	"		7	680	750	10	00
Stouffville Electric Light Co	17	"	"	"			375	375	10	00
Wright & McKinlay, Shelburne	18	"	"	"			100	100	10	00
Corporation of the Village of Markham	19	"	"	"			350	350	10	00
Tagona Water and Light Co., Sault Ste. Maria	20	"	"	"		62	2,523	3,143	25	00
Gravenhurst Electric Light and Power Co	21	"	"	"		10	870	970	10	00
Corporation of the Town of Barrie	22	"	"	"		50	4,000	4,500	25	00
John Philip, Grand Valley	23	"	"	"		3	600	630	10	00
Corporation of Huntsville	24	"	"	"			900	900	10	00
Simon Plewes, Creemore	25	"	"	"			400	400	10	00
Isaac J. Gould, Uxbridge	26	"	"	"		12	552	672	10	00
Milton Electric Light and Power Co., Ltd	27	"	"	"		20	425	625	10	00
Midland Electric Co., Ltd	28	"	"	"		35	900	1,250	25	00
Joseph Knox, Elmvale	29	"	"	"			500	500	10	00
Glen Williams Electric Light Co	30	"	"	"		18	600	780	10	00
Joseph Knox, Stayner	31	"	"	"			650	650	10	00
Orangeville Electric Light and Power Co	32	"	"	"		28	1,000	1,280	25	00
Hutton Electric Co., Brampton	33	"	"	"		30	648	948	10	00
Corporation of the Village of Beeton	34	"	"	"			775	775	10	00

APPENDIX J—*Continued.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the year ended June 30, 1901.

District.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Toronto—*Con.*	C. M. B. Lawrence, Oakville	35	C. I. R., Toronto	1900-1901.	25	740	990	10 00	
	Corporation of the Town of Newmarket	36	" "	"	.....	1,038	1,038	25 00	
	J. M. Deagle, Erin	37	" "	"	.....	200	200	10 00	
	Municipality of Weston	38	" "	"	17	550	720	10 00	
									935 00
Montreal	La Corporation de la Ville de Joliette	1	" Joliette	"	33	1,773	2,103	25 00	
	Corporation of the Village of Huntingdon	1	" Montreal	"	.....	650	650	10 00	
	Royal Electric Co., Montreal	2	" "	"	2,564	93,498	119,138	25 00	
	La Compagnie de Lumière Electrique Impériale, Montréal	3	" "	"	44	13,512	13,952	25 00	
	J. T. Ayers, Lachute	4	" Montreal	"	.....	900	900	10 00	
	Jean Roux, Ste. Thérèse	5	" "	"	.....	200	200	10 00	
	La Compagnie d'Eclairage Electrique de Terrebonne	6	" "	"	.....	338	338	10 00	
	Gazette Printing Co., Montreal	7	" "	"	.....	800	800	10 00	
	Beauharnois Electric Light Co	8	" "	"	.....	350	350	10 00	
	St. Jérôme Power and Electric Light Co., Ltd	9	" "	"	.....	700	700	10 00	
	Corporation of the Town of Lachine	10	" "	"	50	1,300	1,800	25 00	
	Lachute Electric Light Co	11	" "	"	.....	300	300	10 00	
	Lachine Rapids Hydraulic Land Co., Ltd., Montreal	12	" "	"	382	61,730	65,550	25 00	
	Valleyfield Electric Co., Ltd	13	" "	"	65	1,700	2,350	25 00	
	Standard Light and Power Co., Montreal	14	" "	"	40	400	800	10 00	
	Laurentian Water and Power Co., Ste. Agathe des Monts	15	" "	"	1	900	910	10 00	
	North Shore Power Co., Three Rivers	1	" Three Rivers	"	86	3,515	4,375	25 00	
	Achille Gagnon, Victoriaville	1	" Victoriaville	"	.....	2,000	2,000	25 00	
	Corporation of Drummondville	2	" "	"	.....	710	710	10 00	
									310 00
Quebec	La Compagnie des Eaux et de l'Electricité de Chicoutimi	1	" Quebec	"	.....	1,600	1,600	25 00	
	La Compagnie Manufacturière et Electrique de Montmagny	2	" "	"	2	980	1,000	10 00	
	Quebec Railway Light and Power Co	3	" "	"	600	33,000	39,000	25 00	
	Jacques Cartier Water and Power Co., Quebec	4	" "	"	.....	10,000	10,000	25 00	
	The Fraserville Co., Ltd	5	" "	"	6	1,500	1,560	25 00	
	M. A. & H. Grandbois, St. Casimir	6	" "	"	...	250	250	10 00	
	Canadian Electric Light Co., Lévis	7	" "	"	.....	2,500	2,500	12 50	
									132 50

Sherbrooke	Knowlton Electric Light Co	1	"	Sherbrooke	"		375	375	10 00		
	P. Champoux & Bros., Disraeli	2	"	"	"		675	675	10 00		
	Sherbrooke Gas and Water Co.	3	"	"	"	92	7,300	8,220	25 00		
	Corporation of the Town of Magog	4	"	"	"		1,306	1,306	25 00		
	Coaticooke Electric Light and Power Co.	5	"	"	"	28	1,200	1,480	25 00		
	Corporation of the Village of Granby	6	"	"	"	40	2,000	2,400	25 00		
	Farnham Electric Light Co	7	"	"	"		953	953	10 00		
	W. S. Foster, Waterloo	8	"	"	"		1,000	1,000	10 00		
	G. K. Nesbitt, Cowansville	9	"	"	"		400	400	10 00		
	Eastern Townships Electric Co., North Hatley	10	"	"	"		950	950	10 00		
	Stanstead Electric Light Co	11	"	"	"	19	725	915	10 00		
	French Bros., Sawyerville	12	"	"	"		80	80	10 00		
	Richmond County Electric Co, Richmond	13	"	"	"		1,414	1,414	25 00		
	Napoléon Lemay, St. Camille	14	"	"	"		150	150	10 00		
	Parker & Howe, Dixville	15	"	"	"		175	175	10 00		
	La Compagnie d'Eclairage Electrique de Mégantic	16	"	"	"		680	680	10 00		
	M. S. Cornell & Sons, East Stanbridge	17	"	"	"		125	125	10 00		
	St. John's Electric Light Co	18	"	"	"	19	1,500	1,690	25 00		
	Cosey & Campbell, Bedford	19	"	"	"		560	560	10 00		
	Canadian Woollen Mills Co., St. Hyacinthe	1	"	St. Hyacinthe	"		20	20	10 00		
	La Compagnie de Gaz Electricité et Pouvoirs, St. Hyacinthe	2	"	"	"	27	6,000	6,270	25 00		
	La Compagnie Electrique de Plessisville	3	"	"	"		1,288	1,288	25 00		
										340	00
St. John	Carleton Electric Light Co., St. John, N.B., West Side	1	"	St. John	"	28	500	780	10 00		
	Fredericton Gas Light Co	2	"	"	"	75	250	1,000	25 00		
	Sackville Electric Light and Telephone Co	3	"	"	"		450	450	10 00		
	Sussex Water and Electric Light Co	4	"	"	"		575	575	10 00		
	Woodstock Electric Light Co., Ltd	5	"	"	"		850	850	10 00		
	St. Stephen Electric Light Co	6	"	"	"	50	1,050	1,550	25 00		
	Town of Campbellton	7	"	"	"	22	500	720	10 00		
	St. John Railway Co	8	"	"	"	420	9,800	14,000	25 00		
	City of Moncton Water and Light Department	9	"	"	"	96	1,156	2,116	25 00		
	Chatham Electric Light Co	10	"	"	"		2,500	2,500	25 00		
	Small & Fisher Co., Ltd., Woodstock	11	"	"	"		500	500	10 00		
										185	00
Halifax	Prince Edward Island Electric Co., Charlottetown	1	"	Charlottetown	"	85	7,000	7,850	25 00		
	Full Electric Co. of Prince Edward Island, Charlottetown	2	"	"	"	7	2,200	2,270	25 00		
	Montague Electric Co	3	"	"	"		325	325	10 00		
	Kentville Electric Light and Power Co., Ltd	1	"	Halifax	"		900	900	10 00		
	Digby Electric Light Plant	2	"	"	"		500	500	10 00		
	Windsor Electric Light and Power Co., Ltd.	3	"	"	"		2,500	2,500	25 00		
	Bridgewater Power Co., Ltd.	4	"	"	"		900	900	10 00		
	Edison Electric Light and Power Co. of Springhill, Ltd	5	"	"	"	3	570	600	10 00		
	Dartmouth Gas, Electric Light, Heating and Power Co., Ltd	6	"	"	"		850	850	10 00		
	Halifax Electric Tramway Co., Ltd	7	"	"	"	304	18,830	21,870	25 00		
	Bear River Electric Light, Heating and Power Co., Ltd	8	"	"	"		400	400	10 00		
	Chambers Electric Light and Power Co., Truro	9	"	"	"		1,300	1,300	25 00		
	Town of Parrsboro'	10	"	"	"		776	776	10 00		
	Acadia Electric Light Co., Wolfville	11	"	"	"		850	850	10 00		
	C. O'Dell Electric Light Co., Ltd., Annapolis	12	"	"	"		700	700	10 00		

APPENDIX J—*Concluded.*

STATEMENT showing the Electric Light Companies registered under the Electric Light Inspection Act, during the Year ended June 30, 1901.

Districts.	From whom Collected.	Serial No.	By whom Collected.	Certificate for Fiscal Year.	Number of Lamps.			Registration Fees.	Totals.
					*Arc.	Incandescent.	Totals.		
								$ cts.	$ cts.
Halifax	John Christie, Shubenacadie	13	C. I. R., Halifax	1900-1901.	.....	320	320	10 00	
	Lunenburg Gas Co	14	" "	"	1	1,400	1,410	25 00	
	Yarmouth Street Railway Co., Ltd	15	" "	"	.....	200	200	10 00	
	Bridgetown Electric Light, Heat and Power Co	16	" "	"	.....	300	300	10 00	
	Yarmouth Gas Light Co., Ltd	17	" "	"	36	.....	360	10 00	
	Antigonish Electric Co	1	" Pictou	"	..	940	940	10 00	
	New Glasgow Electric Co., Ltd	2	" "	"	26	3,600	3,860	25 00	
	North Sydney Electric Light Co	3	" "	"	...	1,200	1,200	25 00	
	Sydney Gas and Electric Light Co	4	" "	"	3	2,500	2,530	25 00	
									375 00
Winnipeg	Calgary Water Power Co., Ltd	1	" Calgary	"	25	1,700	1,950	25 00	
	Lethbridge Waterworks and Electric Light Co., Ltd	2	" "	"	.....	1,000	1,000	10 00	
	Edmonton Electric Lighting and Power Co., Ltd	3	" "	"	.....	1,400	1,400	25 00	
	Corporation of the Town of Port Arthur	1	" Port Arthur	"	.....	1,130	1,130	25 00	
	Board of Water and Light Commissioners, Fort William	2	" "	"	400	2,300	6,300	25 00	
	Winnipeg Electric Street Railway Co	1	" Winnipeg	"	.....	12,000	12,000	25 00	
	Citizens' Telephone and Electric Co. of Rat Portage, Ltd	2	" "	"	45	6,000	6,450	25 00	
	Corporation of the Town of Neepawa	3	" "	"	11	800	910	10 00	
	Central Electric Co., Ltd., Portage la Prairie	4	" "	"	11	2,000	2,110	25 00	
	Brandon Electric Light Co., Ltd	5	" "	"	.....	3,000	3,000	25 00	
	Prince Albert Electric Light and Power Co., Ltd	6	" "	"	... ..	475	475	10 00	
	W. J. Bruce & Co., Selkirk	7	" "	"	.....	750	750	10 00	
	Morden Electric Light Co	8	" "	"	.....	700	700	10 00	
	Regina Electric Light and Power Co	9	" "	"	6	1,300	1,360	25 00	
									275 00
Vancouver	British Columbia Electric Railway Co., Ltd., Vancouver	1	" Vancouver	"	411	29,424	33,534	25 00	
	Corporation of the City of Westminster	2	" "	"	91	5,000	5,910	25 00	
	Revelstoke Water, Light and Power Co., Ltd	3	" "	"	3	1,800	1,830	25 00	
	Corporation of the City of Nelson	4	" "	"	20	4,000	4,200	25 00	
	West Kootenay Power and Light Co., Ltd	5	" "	"	20	4,000	4,200	25 00	
	Greenwood Electric Co., Ltd	6	" "	"	6	1,500	1,560	25 00	
	Sandon Waterworks and Light Co	7	" "	"	1	243	253	10 00	
	Corporation of the City of Grand Forks	8	" "	"	....	900	900	10 00	

	Canadian Smelting Works, Trail	9	"	"	"	10	450	550	10 00		
	Kootenay Electric Co., Limited	10	"	"	"	.....	846	846	10 00		
	Corporation of the City of Kamloops	11	"	"	"	.....	1,200	1,200	25 00		
											215 00
Victoria	Victoria Electric Co., Ltd.	1	"	Victoria	"	.....	300	300	10 00		
	Nanaimo Electric Light, Power and Heating Co.	2	"	"	"	52	1,100	1,620	25 00		
	British Columbia Electric Railway Co., Ltd., Victoria	3	"	"	"	29	18,000	18,290	25 00		
											60 00
											4,797 50

*Each arc lamp is reckoned as equal to ten incandescent.

INLAND REVENUE DEPARTMENT,
OTTAWA, August 10, 1901.

W. J. GERALD,
Deputy Minister.

DOMINION ELECTRICAL STANDARDS

BY

ORMOND HIGMAN, M. INST. E. E.; A. M. CAN. SOC. C. E.,

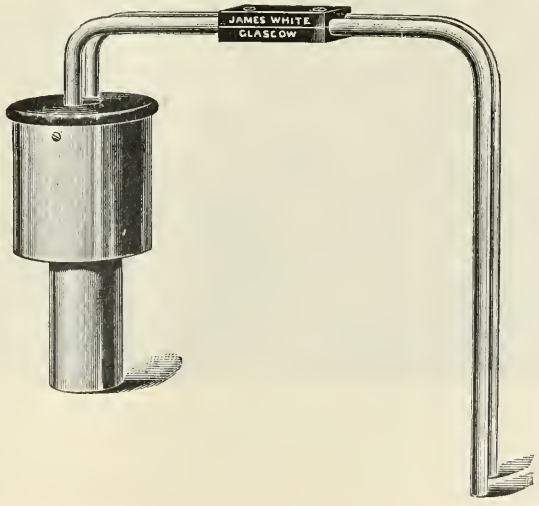
Chief Electrical Engineer, Inland Revenue Department.

In 1894 when Parliament passed the Electrical Units Act, (Schedule A.) the writer was called upon to procure the apparatus necessary to produce and express the standard units therein legalized.

In seeking for guidance in the discharge of this important and responsible duty, I naturally turned to the brilliant work accomplished by the Committee on Electrical Standards appointed by the British Association in the seventies, and the no less brilliant work accomplished by the Electrical Standards Committee of the Board of Trade and contained in their report to Parliament in 1891-92. The results of the labours of these committees will, I venture to say, be found to be the most interesting and instructive chapters in the history of electrical science. At the period when they commenced their labours the experimental sciences of electricity and magnetism were, for the most part, mere collections of qualitative results estimated by means of units which were altogether arbitrary. The work of the committees changed experimental electricity into an exact science by adopting the C. G. S. system as their fundamental basis, and which enabled them to express their results in units that are altogether independent of instruments or surroundings. For practical purposes, however, it was necessary that the units should find expression in apparatus, the accuracy and constancy of which could not be questioned. For the absolute measurement of current and electro-motive force, both varying and unvarying, Lord Kelvin's instruments were recommended. The following apparatus has been procured by the department as Standards of Electrical measure ; and although not by any means complete, I am glad to be able to report that substantial progress has been made in complying with the requirements of section 3 of the Units Act.

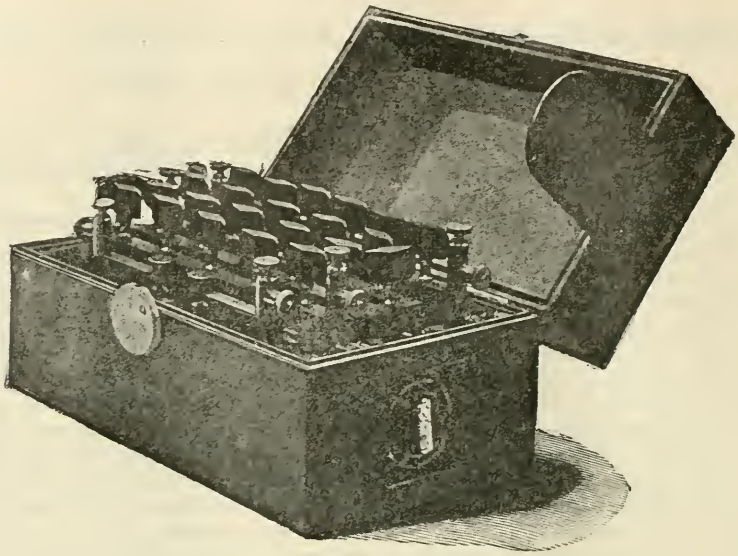
STANDARDS OF RESISTANCE.

Two standard ohms, one of the Board of Trade and one of the Reichsanstalt (Berlin) pattern.

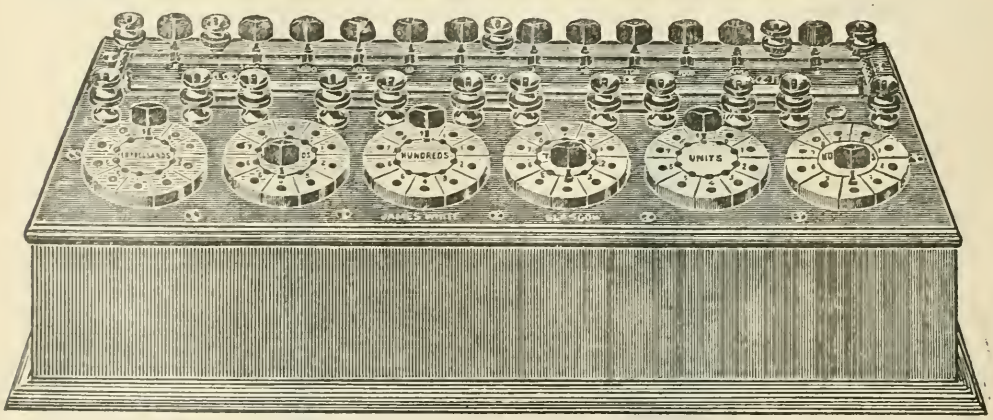


One resistance box containing ten 1 ohm coils with suitable plugging arrangements for putting the coils in series as a 10 ohm standard or in multiple as a $\frac{1}{10}$ ohm standard.

One Kelvin resistance coil 100,000 ohms with 10 sub-divisions of 10,000 ohms, each arranged with plugs for connecting in series or in parallel or any combination of series and parallel.



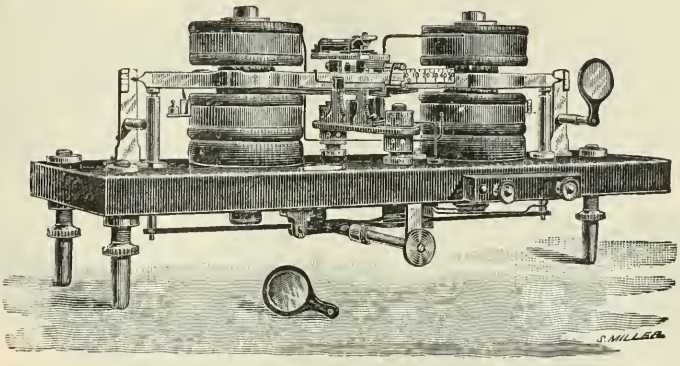
One Wheatstone Bridge (Anthony pattern) with ratio coils 1, 10, 100, 1,000 and 10,000 on each side with bridge coils of tenths, units, tens, hundreds and thousands. These coils are made of manganin wire specially selected and the box is fitted with an electric thermometer. Measurements of great accuracy can be obtajned with this bridge used in conjunction with a sensitive reflecting D'Arsonval galvanometer. Intercomparisons between these standards will be made from time to time and records kept of their variations.



MEASUREMENT OF CURRENT.

For the measurement of current a set of Lord Kelvin's balances has been provided covering the following ranges:

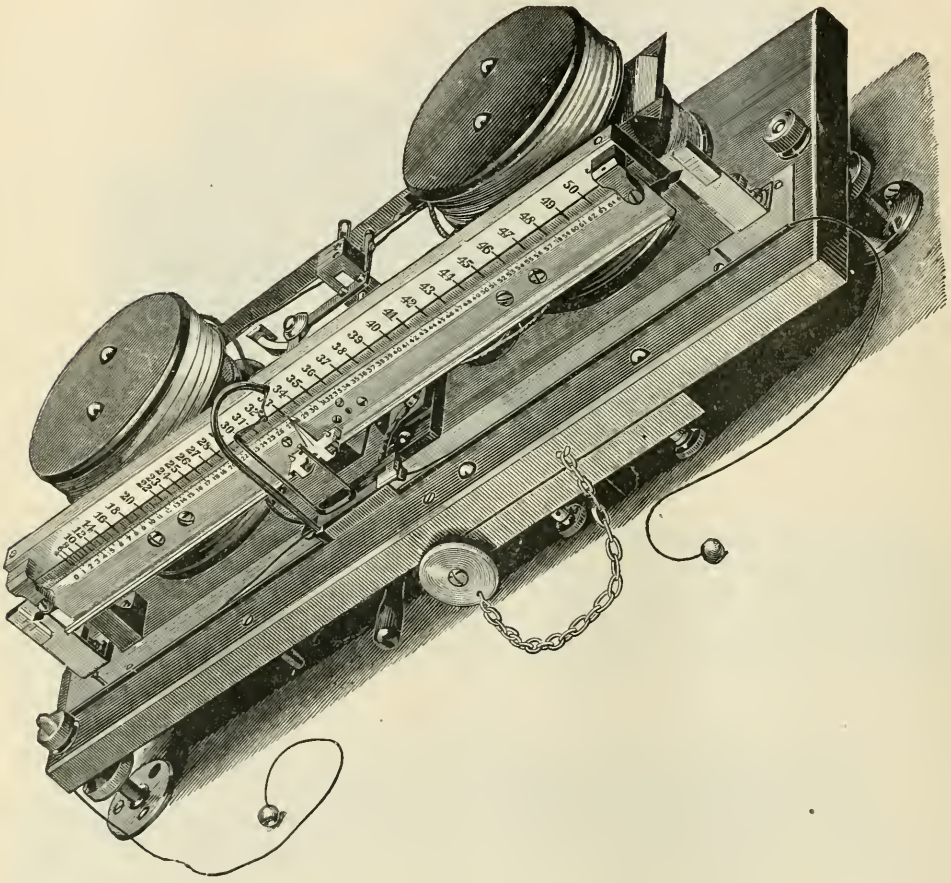
0	to	1	ampere.
1	to	5	"
5	to	25	"
25	to	125	"



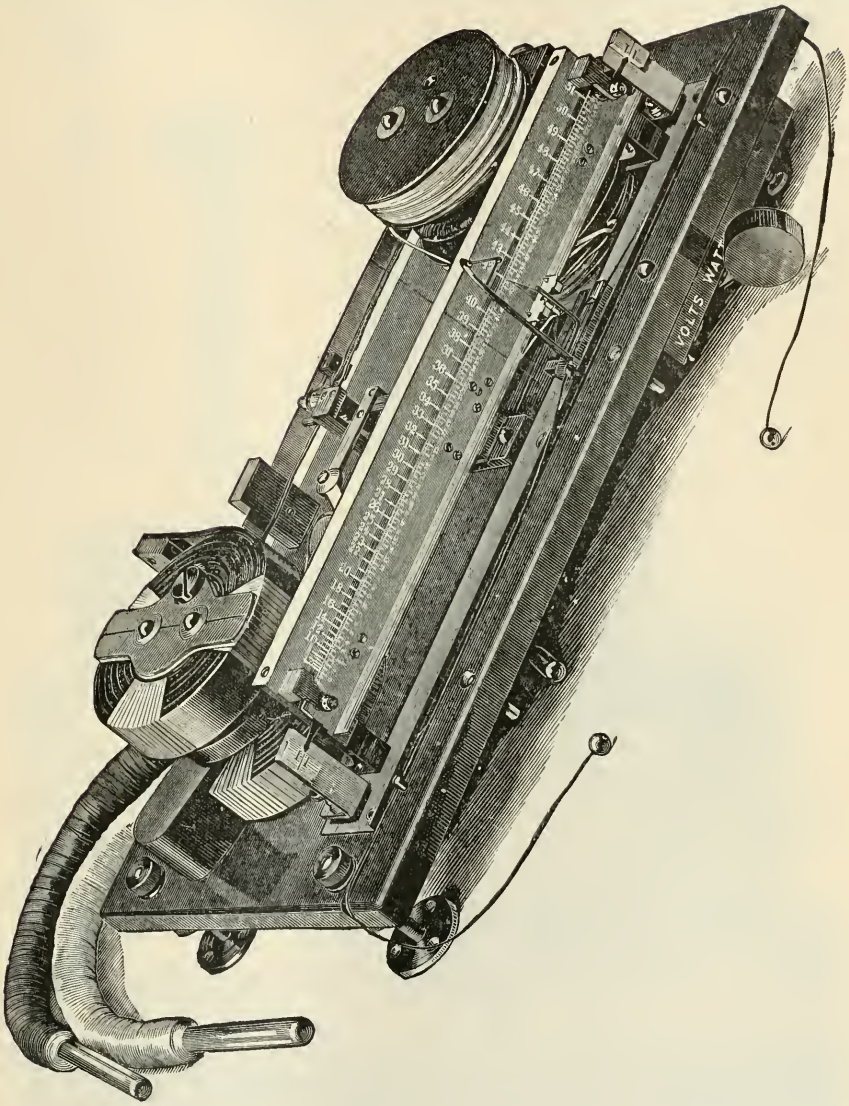
These instruments are founded on the mutal forces, discovered by Ampere, between movable and fixed portions of an electric circuit. The shape chosen for the mutually influencing portions is circular and are called by Lord Kelvin 'Ampere Rings'. In each of the instruments each movable ring is actuated by two fixed rings, all three approxi nately horizontal. There are two such groups of three rings—two movable rings attached to the two ends of a horizontal balance arm pulled, one up and the other down by a pair of fixed rings in its neighbourhood. The current is in opposite directions in the movable rings to practically annul disturbances due to horizontal components of terrestrial or local magnetic forces. It is fortunate that these magnetic disturbances have been thus annulled for reasons that will be alluded to presently. In all of the balances the current goes in opposite directions through the two fixed rings, so that the movable ring is attracted by one of the fixed rings and repelled by the other. The balances were constructed specially for the department and are a modification of the ordinary type. They are intended as ultimate standards, great accuracy and permanency being guaranteed. The scale and sliding weights are taken away and the beam is made specially strong and has a pointer at each end. A scale pan is hung at each end of the beam, and the distance from coil to coil is greater than in the ordinary balance. The method of making an observation is by placing a weight of fixed amount on the left hand scale pan, and the beam is balanced with no current through the coils; the weight is then lifted to the right hand scale pan and the current turned on. The amount of current passing is adjusted till the beam again balances, when the current will be according to the value of the weight used. Tests, having an accuracy of $\frac{1}{20}$ of 1 per cent can be quickly made, and with more careful manipulation, a much higher degree of accuracy can be attained.

For purposes of graduation or standardization, the silver voltameter is used. It is one of the most accurate for calibrating current measuring instruments. It depends on the well-known principle that when a current of electricity flows through an electrolyte, the amount of decomposition resulting in a given time is directly proportional to the

total quantity of electricity which has passed in that time. For any substance 1 coulomb will always decompose or liberate at the cathode the same fixed weight of the substance and is defined as its electro-chemical equivalent. The latest experiments agree in giving 0·001118 (9,634 C.G.S. units) as the electro-chemical equivalent of silver. The specification for the electrolyte is given in schedule B. A more convenient, if not

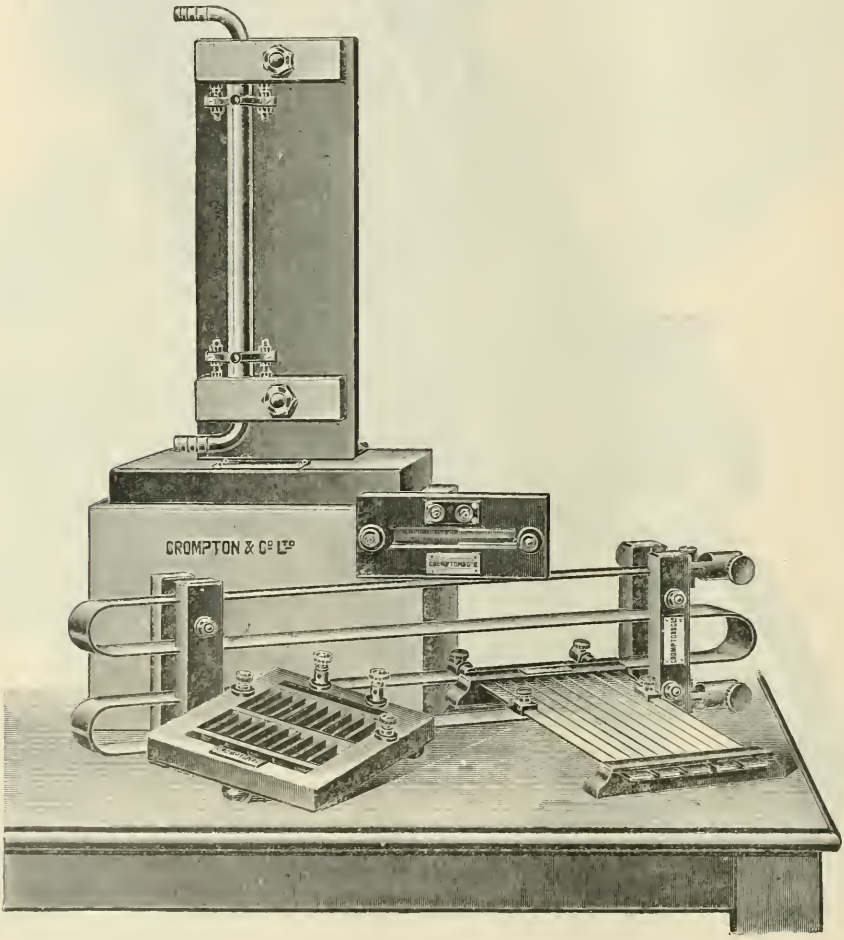


quite as accurate a method is the copper cell. The exerimenter should be careful to procure pure copper sulphate and plates and the use of a chemical balance. A small quanti y of sulphuric acid will improve the electrolyte. The electro-chemical equivalent of copper is 0·00337 or 1·177 grammes of copper are deposited per ampere hour, approximately.


VOLTS
WATTS

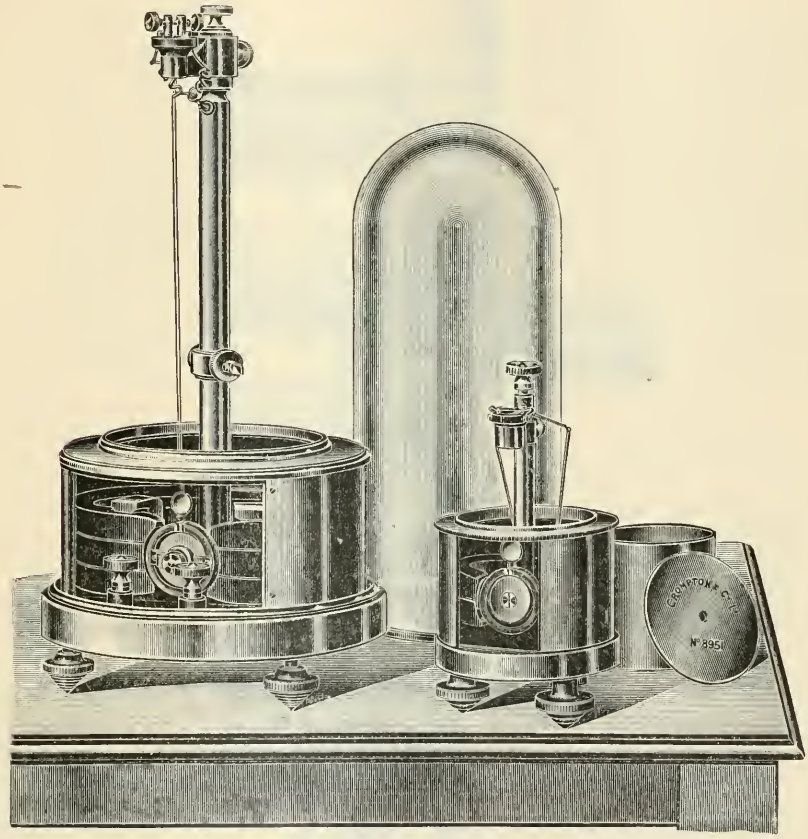
Another method for the measurement of current and the standardization of instruments is the fall of potential or potentiometer method. The department is now installing one of Crompton's laboratory instruments of this type, made expressly to order and suitable for reproducing and comparing standards with the highest possible degree of accuracy. Standard resistances of the following capacity are furnished with the instrument for current measurement :—

Resistance in ohms.	Maximum current in amperes.
1.	1.5
.5	3.
.1	15.
.01	150.
.005	300.



These resistances consist of a sheet or strip of metal, or a coil of wire, each provided with four terminals, two for connection to the circuit and two for connection to the potential leads. The resistances are made of manganin and owing to the exceedingly low temperature co-efficient of the alloy, no temperature correction is necessary except for accuracies exceeding 1 part in 1,000 when a curve giving the temperature value of the

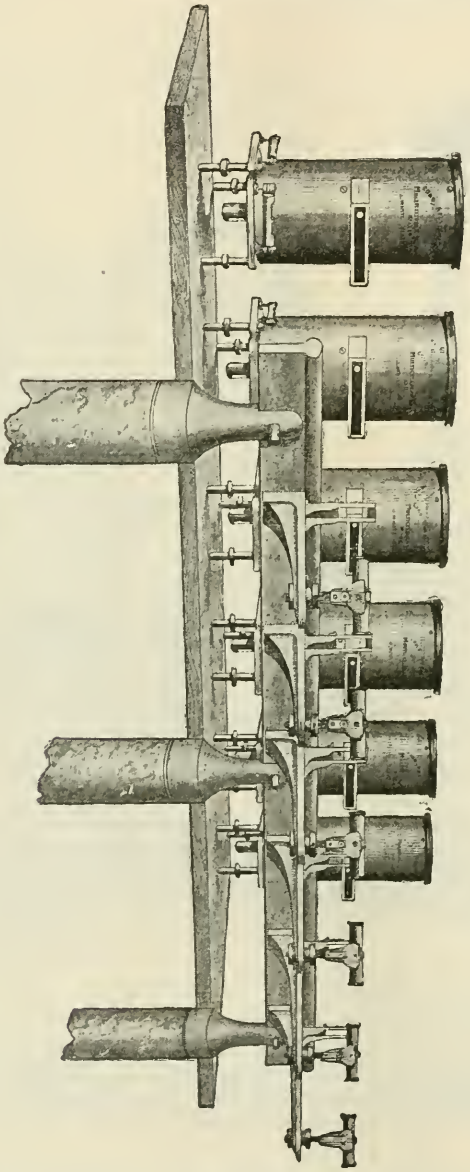
whole range of current that the instrument is capable of carrying is supplied. The current to be measured is passed through one ef these standard resistances and the fall of potential noted. If the resistance standards are properly proportioned to the instrument, the reading in amperes will be direct. Thus a standard carrying 1,500 amperes should cause a fall of 1·5 volts, each section of the instrument being equivalent to $\frac{1}{10}$ of a volt will therefore correspond to 100 amperes. The accuracy of the apparatus for current measurement, as will be observed, is largely dependent on the accuracy with which the standard resistances are constructed.



Another and similar method for the measurement of current by the fall of potential is that known as the "Vienna method." A set of instruments comprising a Weston milli-voltmeter and shunt box have been procured and forms one of the most flexible, and at the same time, accurate means of current measurement. In this as in the preceding method, if the resistances are proportional to the voltmeter, the reading in amperes will be direct. The resistances in the shunt box are made of manganin alloy with practically no temperature variation and are correct to $\frac{1}{5}$ of 1 per cent. The combination gives three full scale readings as follows:— From 0 to 1.5 ampere, from 0 to 15 amperes, and from 0 to 150 amperes. Tests can be made with great rapidity and readings on each scale from a small fraction of an ampere up to 150 amperes can be had in the space of two or three minutes.

MEASUREMENT OF ELECTRO-MOTIVE FORCE.

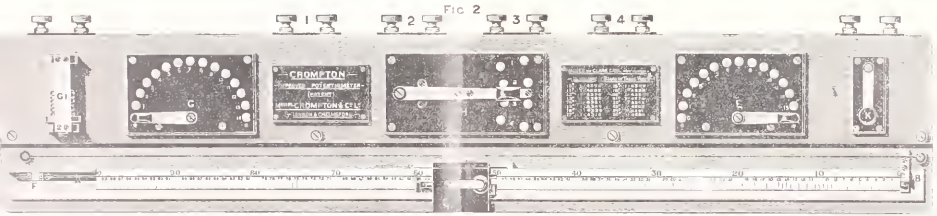
Primary Standards.—Two standard Clark cells; three Hibbard 1 volt cells and a set of six special standard multicellular electrostatic voltmeters by Lord Kelvin. The latter covers a range of from 20 to 3,200 volts and was specially constructed for the department as ultimate standards of E.M.F. great accuracy and permanency, being guaranteed. During the two years since the instruments were first installed, the



variation in the calibrating curves has been less than 1 part in 10,000. These instruments have the great advantage of being equally accurate on direct or alternating circuits. Being electro-static, they use no current and are unaffected by local magnetic conditions. They can be kept continuously in circuit and require no temperature correction.

The instruments are calibrated by comparison with the difference of potential between the terminals of a known resistance through which the current is being

Fig. 2



measured by means of a Kelvin standard centi-ampere balance, or by the potentiometer method.

Inter-comparisons with the standard e.m.f. cells are periodically made and all variations recorded. The method of comparison followed is that known as the Clark-Poggendorff method and consists in the balancing of electro-motive forces against one another by the changing of resistances. It is preferred over most other methods for the reason that it is both a *zero* and *null* method. The apparatus used comprise a sensitive galvanometer, two or three cells of working battery, the E. M. Fs. E_1 and E_2 to be compared and adjustable high resistances r_1 and r_2. Different readings of resistances are made and a comparison of the E. M. F. obtained from the relation :—

$$E_1 : E_2 = r_1 : r_2.$$

The specification for the standard Clark cell will be found in Schedule C.

THE POTENTIOMETER.

This excellent piece of laboratory apparatus and its adjuncts, though equally applicable to the measurement of current and resistance more properly comes under the head of E. M. F. standards for treatment. The fall of potential method of making measurements originated with Poggendorf, but the credit for developing the system from a crude workshop method up to what may fairly be described as a scientific instrument of no mean calibre, mainly belongs to Col. R. E. Crompton, of London. Measurements from the lowest to the highest value may be taken by direct comparison with the legal standard, to well within $\frac{1}{10}$ of one per cent under ordinary circumstances, whilst by special care a far higher degree of accuracy may be attained.

The form of instrument now being furnished the department by the Messrs Crompton may be said to consist of 15 sections of wire connected in series, 14 of which are in the form of coils within the instrument, the 15th being stretched along a scale suitably divided ; they are accurately adjusted with each other, so that with a fixed e. m. f. of 1·5 volts over the whole, each section has a fall of $\frac{1}{10}$ of a volt, the scale beneath the slide wire having 1,000 divisions, each corresponding therefore, to $\frac{1}{10000}$ of a volt. The unknown quantity to be measured is placed in series with a galvanometer attached to the movable contacts on the slide wire and is so connected up that its e. m. f. opposes that of the main circuit of the instrument. No deflection of the galvanometer takes place when the point of balance between the opposing e. m. f's. is obtained. The value of the comparison is then read from the scale. The instrument is calibrated by substituting for x a known value or standard—in this case a standard Clarke's cell—its temperature noted, and the contacts on the slide wire placed upon the figures corresponding with the value of the cell which would be 1.434 or 14 and 34. Resistance is added in the main circuit until there is no deflection on the galvanometer due to the fact of the e. m. f's. in the main and galvanometer circuits being equal ; the instrument is thus standardized from what afterwards becomes the x circuit and is then ready for obtaining the value of unknown e. m. f's. Multiples and submultiples of the ohm are used to vary the range of the instrument. They are so proportioned that their maximum carrying capacity is some definite value proportional to that of the instrument (1·5 volts) and it is entirely upon them that the range of the apparatus depends. Given proper standard resistances, the range of the instrument is practically illimitable.

Weston standard voltmeters are used as secondary standards of e. m. f., both for direct and alternating current.

One of these, for alternating current work was, specially made for our laboratory and has its coils and working parts immersed in oil, thus making it absolutely *dead beat* in its operation. It is supplied with a differential scale giving readings to $\frac{1}{5}$ volt. These voltmeters are furnished with multipliers giving ranges from 0 to 1,500 volts and accurate to within $\frac{1}{10}$ of one per cent.

MEASUREMENT OF ELECTRICAL ENERGY

One Standard Kelvin Watt Balance.—This balance is intended to measure the true energy developed in an inductive alternating current circuit. It is similar in form to the Ampere Balances, but the movable coils are wound with fine wire. These coils are of low resistance and are joined up in series with a large non-inductive resistance in a potential circuit across the mains, while the fixed coils carry the whole current to be measured. Three sets of weights are supplied with the instrument weighing respectively 1·7564 grms., 4·3910 grms., and 17·5640 grms. The constant for each set of weights with 1·000 ohms in the fine wire circuit is 2 watts, 5 watts and 20 watts per division of the scale. The constants vary directly as the resistance in the fine wire circuit. This instrument has proven to be an excellent standard having been in constant use for four years with absolutely no change in its accuracy.

Secondary Watt Standards in use by the departmental officers are those of the Weston and Hoyt types.

ACCESSORIES.

The following apparatus as accessories to the foregoing standards have been installed in the department:—

One 5 Kilowatt rotary transformer 500 to 120 volts for charging storage batteries;

One 5 Kilowatt alternator 60 cycles 104 volts.

One 5 Kilowatt alternator 130 cycles 104 volts.

One 5 Kilowatt direct current motor for operating the alternators.

300 small cells of secondary battery as a source of e. m. f. for direct current pressure tests.

55 cells type E 9 chloride accumulators for operating the direct current motor.

The alternators are so constructed as to admit of wide ranges of variation both in respect of voltage and frequency.

PHOTOMETERIC MEASUREMENT OF LIGHT.

The Bunsen Photometer is used throughout the Dominion by the officers of the department. This piece of apparatus is so well known that a lengthy explanation of it before this association would be quite unnecessary. It is known as the grease spot method, and consists mainly of a wooden movable frame over which a piece of white paper is fixed with a grease spot in the centre. The two sources of light to be compared shines on either side of the disc and the practical value of the light to be measured is determined by the total brightness which that light is capable of producing on the disc when compared with the total brightness which the unit candle is capable of producing on the same surface. In order that both sides of the disc may be read simultaneously, a system of mirrors, introduced by Rudorff, is used. The sliding carriage containing this arrangement of disc and mirrors is moved along the scale until it reaches a point where the spot entirely disappears. The candle-power of the light being measured is then obtained by dividing the square of the distance of the source of light from the screen by the square of the distance of the standard candle from the screen. Notwithstanding the fact that the sperm candle is not a first-class standard, fairly accurate work can be done with it. The incandescent lamp is now more or less used as a secondary standard for the practical measurement of light, but the system is dependent on too many conditions being fulfilled to be accepted with any degree of confidence. Sir William Preece, among a number of others, considered that an incandescent lamp of a given type, coming from the same maker, present only insignificant differences among themselves with respect to luminous intensity and efficiency, and he was of the opinion that a very convenient standard of this kind sufficiently exact for most purposes might be obtained. The subject of photometery and light standards, however, is a large one and had better be reserved for treatment on some future occasion.

SCHEDULE A.

57-58 VICTORIA.

CHAP. 38.

An Act respecting the Units of Electrical Measure.

[*Assented to 23rd July, 1894.*]

HER Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. This Act may be cited as *The Electrical Units Act.* Short title.

2. The units of electrical measure for Canada shall be the following:— Units established.

(*a.*) As a unit of resistance, the ohm, which is based upon the ohm equal to 10^9 units of resistance of the centimetre-gramme-second system of electro-magnetic units, and is represented by the resistance offered to an unvarying electric current by a column of mercury, at the temperature of melting ice 14·4521 grammes in mass, of a constant cross-sectional area and of the length of 106·3 centimetres. Ohm.

(*b.*) As a unit of current, the ampere, which is one-tenth of the unit of current of the centimetre-gramme-second system of electro-magnetic units, and is represented sufficiently well for practical use by the unvarying current which, when passed through a solution of nitrate of silver in water, and in accordance with the specification contained in schedule one to this Act, deposits silver at the rate of 0·001118 of a gramme per second. Ampere.

(*c.*) As a unit of electro-motive force, the volt, which is the electro-motive force that, steadily applied to a conductor whose resistance is one ohm, will produce a current of one ampere, and which is represented sufficiently well for practical use by $\frac{1000}{1434}$ of the electro-motive force between the poles or electrodes of the voltaic cell known as Clark's cell, at a temperature of 15° centigrade and prepared in accordance with the specification contained in schedule two to this Act. Volt.

(*d.*) As a unit of quantity, the coulomb, which is the quantity of electricity transferred by a current of one ampere in one second. Coulomb

(*e.*) As a unit of capacity, the farad, which is the capacity of a condenser charged to a potential of one volt by one coulomb. Farad.

Joule. (*f.*) As a unit of work, the joule, which is equal to 10^7 units of work in the centimetre-gramme-second system, and is represented sufficiently well for practical use by the energy expended in one second by one ampere in one ohm.

Watt. (*g.*) As a unit of power, the watt, which is equal to 10^7 units of power in the centimetre-gramme-second system, and is represented sufficiently well for practical use by the work done at the rate of one joule per second.

Henry. (*h.*) As the unit of induction, the henry, which is the induction in a circuit when the electro-motive force induced in that circuit is one volt, while the inducing current varies at the rate of one ampere per second.

Units and apparatus to be in Department of Inland Revenue.

3. The units of electrical measure described in the next preceding section, or such standard apparatus as is necessary to produce them, shall be deposited in the Department of Inland Revenue and shall form part of the system of standards of measure and weight established by *The Weights and Measures Act.*

SCHEDULE B.

In the following specification, the term silver voltameter means the arrangement of apparatus by means of which an electric current is passed through a solution of nitrate of silver in water. The silver voltameter measures the total electrical quantity which has passed during the time of the experiment; and by noting this time, the time-average of the current, or, if the current has been kept constant, the current itself, can be deduced.

In employing the silver voltameter to measure currents of about one ampere, the following arrangements should be adopted. The cathode on which the silver is to be deposited should take the form of a platinum bowl not less than 10 centimetres in diameter and from 4 to 5 centimetres in depth. The anode should be a plate of pure silver 30 square centimetres in area and 2 or 3 millimetres in thickness. This is supported horizontally in the liquid near the top of the solution by a platinum wire passed through holes in the plate at opposite corners. To prevent the disintegrated silver which is formed on the anode from falling on to the cathode, the anode should be wrapped round with pure filter paper, secured at the back with sealing wax.

The liquid should consist of a neutral solution of pure silver nitrate containing about 15 parts by weight of the nitrate to 85 parts of water.

The resistance of the voltameter changes somewhat as the current passes. To prevent these changes having too great an effect on the current, some resistance besides that of the voltameter should be inserted in the circuit. The total metallic resistance of the circuit should not be less than 10 ohms.

SCHEDULE C.

The cell consists of zinc and mercury in a saturated solution of zinc sulphate and mercurous sulphate in water, prepared with mercurous sulphate in excess, and is conveniently contained in a cylindrical glass vessel.

The mercury —To secure purity it should be first treated with acid in the usual manner, and subsequently distilled *in vacuo.*

The zinc.—Take a portion of a rod of pure re-distilled zinc, solder to one end a piece of copper wire, clean the whole with glass paper, carefully removing any loose pieces of the zinc. Just before making up the cell, dip the zinc into dilute sulphuric acid, wash with distilled water, and dry with a clean cloth or filter paper.

The zinc sulphate solution.—Prepare a saturated solution of pure ("pure re-crystallized") zinc sulphate by mixing in a flask distilled water with nearly twice its weight of crystals of pure zinc sulphate, and adding zinc oxide in the proportion of about 2 per cent by weight of the zinc sulphate crystals to neutralize any free acid. The crystals should be dissolved with the aid of gentle heat, but the temperature to which the solution is raised should not exceed 30° C. Mercurous sulphate treated as hereinafter described, should be added in the proportion of about 12 per cent by weight of the zinc sulphate crystals, and the solution filtered, while still warm, into a stock bottle. Crystals should form as it cools.

The mercurous sulphate.—Take mercurous sulphate, purchased as pure, and wash it thoroughly with cold distilled water by agitation in a bottle; drain off the water, and repeat the process at least twice. After the last washing, drain off as much of the water as possible.

Mix the washed mercurous sulphate with the zinc sulphate solution, adding sufficient crystals of zinc sulphate from the stock bottle to ensure saturation, and a small quantity of pure mercury. Shake these up well together to form a paste of the consistence of cream. Heat the paste, but not above a temperature of 30° C. Keep the paste for an hour at this temperature, agitating it from time to time; then allow it to cool, continuing to shake it occasionally while cooling. Crystals of zinc sulphate should then be distinctly visible, and should be distributed throughout the mass. If this is not the case, add more crystals from the stock bottle, and repeat the whole process. This method ensures the formation of a saturated solution of zinc and mercurous sulphates in water.

Contact is made with the mercury by means of a platinum wire about No. 22 gauge. This is protected from contact with the other materials of the cell by being sealed in a glass tube. The ends of the wire project from the ends of the tube; one end forms the terminal; the other end and a portion of the glass tube dip into the mercury.

REPORT, RETURNS AND STATISTICS

OF THE

INLAND REVENUES

OF THE

DOMINION OF CANADA

FOR THE FISCAL YEAR ENDED JUNE 30

1901

PART III

ADULTERATION OF FOOD

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1901

[No. 14—1902.]

CONTENTS.

					Page.
Deputy Minister's Report					1
Official Analysts' Reports :—					
District of Halifax, N.S					3
do Quebec					4
do Ottawa					5
do Toronto					6
do London					7
do Winnipeg					8
do British Columbia					9
Appendix "A" Inspection of Lager Beer					10
do "B"	do	Tea			11 — 13
do "C"	do	Aerated Waters			14 — 17
do "D"	do	Potted Cream Cheese			18 — 19
do "E"	do	Cocoa			20 — 21
do "F"	do	Jam			22 — 25
do "G"	do	Pickles			26
do "H"	do	Saltpetre			27 — 29
do "I"	do	Borax			30 — 31
do "J"	do	Vinegar			32 — 37
do "K"	do	Linseed oil			38 — 41
do "L"	Bulletin No.	74.	Milk, 1900		42 — 53
do "M"	do	75.	Fertilizers, 1901		54 — 99
do "N"	do	76.	Canned Salmon		100 —113
do "O"	do	77.	Effervescent Sodium Phosphate		115 —128
do "P"	do	78.	White Lead in oil		129 —141

REPORT

OF THE

DEPUTY MINISTER OF INLAND REVENUE.

INSPECTION OF FOODS, DRUGS AND FERTILIZERS.

To the Honourable M. E. Bernier,
Minister of Inland Revenue.

Sir,—I have the honour herewith to submit the reports of the official analysts of the Dominion for the fiscal year ended June 30, 1901.

The following is a summary statement of the whole number of samples analysed by them :—

Description of Sample.	Genuine.	Adulterated.	Doubtful.	Not Classed.	Total.
Canned salmon	94	5	1		100
Lager beer	8	1	1		10
Tea	38	2			40
Aerated waters	61	2	6		69
Milk	127	18	10		155
Cream cheese	16	9			25
Abbey's effervescing salt	1			1	2
Eno's fruit salt	1				1
Effervescing phosphate of soda	19	40	5		64
Pickles	8		2		10
Cocoa	1	6			7
Jams	14	10	8		32
Borax	31	3			34
Saltpetre	25	15	2		42
Baking powder		1			1
Cream of tartar	8	1			9
White lead in oil	56	43			99
Fertilizers	57	7		1	65
Vinegar	31	9	14		54
Turpentine	31	1			32
Linseed oil	25	5			30
Total	652	178	49	2	881

I have the honour to be, sir,
Your obedient servant,
W. J. GERALD,
Deputy Minister

Inland Revenue Department,
Ottawa, October 27, 1901.
14—1

REPORTS OF PUBLIC ANALYSTS.

Laboratory of the Official Analyst for
Nova Scotia and Prince Edward Island,
66 Bedford Row,
Halifax, N.S., August 17, 1901.

The Deputy Minister of Inland Revenue,
Ottawa.

Sir—I have the honour to submit my annual report on the samples of food, &c., analysed by me during the year ending June 30, 1901, as follows :

Sample.	Genuine.	Adulterated.	Not Classed.	Total.
Canned salmon	16			16
Tea	8			8
Ginger beer, &c.	13			13
Milk	21	3		24
Cream cheese	1	9		10
Effervescent phosphate of soda		10		10
Borax	4	1		5
Saltpetre	3	2		5
Baking powder		1		1
Cream of tartar		1		1
White lead	8	8		16
Fertilizers	2	7	1	10
Oil of turpentine	3			3
Raw linseed oil		5		5
	79	47	1	127

I have the honour to be, sir,
Your obedient servant,
MAYNARD BOWMAN.

ANNUAL REPORT of the samples analysed in the Quebec Laboratory, from July 1, 1900 to June 30, 1901.

Description of Sample.	Month in which Analysed.	Number of Sample.	Genuine.	Doubtful.	Adulterated.	Sold as Compound	Total.
	1900.						
Canned salmon	July	16	13	1	2		16
Saltpetre	August	10	8		2		10
Ginger beer	September	12	6	4	2		12
Lemon sour	"	2	2				2
Eff. sodium phosphate	"	1			1		1
Pickles	October	10	8	2			10
Milk	November	24	23		1		24
Eff. sodium phosphate	December	10	5		5		10
	1901.						
Borax	January	5	5				5
Saltpetre	"	5	3		2		5
White lead in oil	February	16	7		9		16
Vinegar on pickles	March	5	1	4			5
Vinegar	"	5	2	2	1		5
Fertilizers	April	10	10				10
Raw linseed oil	June	5	5				5
Turpentine	"	5	4		1		5
Total		141	102	13	26		141

DR. M. FISET,
Analyst.

LABORATORY INLAND REVENUE,
QUEBEC, July 8, 1901.

OTTAWA, August 19, 1901.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to make the following report on the inspection of samples which were referred for my examination during the fiscal year ending June 30, 1901.

Sample.	Genuine.	Adulterated.	Doubtful.	Total.
Canned salmon	14			14
Tea	7			7
Ginger beer	4		2	6
Lemon sour	6			6
Effervesc. soda phosphate	4	3	4	11
Jams	9	4	1	14
Milk	24		2	26
Saltpetre	3		2	5
Borax	5			5
White lead in oil	7	7		14
Vinegar	5	4		9
Fertilizers	9			9
Oil of turpentine	5			5
Linseed oil	4			4
Total	106	18	11	135

I have the honour to be, sir,
Yours respectfully,

F. X. VALADE, M.D
Public Analys

OTTAWA, September 21, 1901.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to submit a statement of the work done in my laboratory during the past year. I have analysed 141 samples, of which 118 were reported as unadulterated, 16 as adulterated, and 7 as doubtful. The details of this work are given in the annexed table.

SAMPLES examined by Official Analyst at Toronto during year 1900-01.

Sample.	Genuine.	Adulterated.	Doubtful.	Total.
Canned salmon	16			16
Larger beer	8	1	1	10
Aerated waters	12			12
Effervesc. soda phosphate	2	8	1	11
Eno's fruit salts	1			1
Potted cheese	10			10
Milk	19		5	24
Saltpetre	3	2		5
Borax	5	1		6
Vinegar	5			5
Vinegar from pickles	5			5
White lead in oil	12	4		16
Fertilizers	10			10
Linseed oil	4			4
Turpentine	6			6
Totals	118	16	7	141

I have the honour to be, sir,
Your obedient servant,

W. HODGSON ELLIS.

OFFICE OF PUBLIC ANALYST,
LONDON, June 30, 1901.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement of results of analyses of samples submitted to me by the department during the past year :—

Samples.	Genuine.	Adulterated.	Doubtful.	Total.
Canned Salmon	14			14
Tea	5	2		7
Aerated waters	10			10
Effervescent salts	1			1
Cocoa	1	6		7
Milk	18		3	21
Effervescent phosphate of soda	3	7		10
Saltpetre	2	2		4
Borax	4	1		5
Vinegar	6	3		9
White lead	10	4		14
Fertilizers	18			18
Oil of turpentine	5			5
Raw linseed oil	4			4
Totals	101	25	3	129

I have the honour to be, sir,
Your obedient servant,

FRANKLIN T. HARRISON.

WINNIPEG, CANADA, July 20, 1901.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I have the honour to present a tabulated statement showing the general results of the examination of samples submitted to me by the department during the year ending June 30, 1901 :—

Samples.	Genuine.	Adulterated.	Doubtful.	Not Classified.	Total.
Canned Salmon	12	0	0		12
Tea	12	0	0		12
Ginger beer and lemon sour	8	0	0		8
Effervescent sodium phosphate	4	5	0		9
Abbey's Effervescent Salt				1	1
Borax	4	0	0		4
Saltpetre	1	3	0		4
White lead in oil	6	6	0		12
Vinegar			8		8
Fertilizers	8	0	0		8
Turpentine	4	0	0		4
Linseed oil	4	0	0		4
Jam	5	6	7		18
Milk	16	2	0		18
Totals	84	22	15	1	122

I have the honour to be, sir,
Your obedient servant,

E. B. KENRICK

PUBLIC ANALYST'S OFFICE,
VICTORIA, B.C., Sept. 12, 1901.

To the Commissioner of Inland Revenue,
Ottawa.

SIR,—I beg to submit report for year ending June 30, 1901 :—

Samples.	Genuine.	Adulterated.	Total.
Cream of tartar	8	0	8
Canned salmon	9	3	12
Tea	6	0	6
Milk	6	12	18
Effervescing phosphate	1	1	2
Cream cheese	5	0	5
White lead	6	5	11
Saltpetre	2	2	4
Borax	4	0	4
Vinegar	7	1	8
Oil of turpentine	4	0	4
Linseed oil	4	0	4
Totals	62	24	86

I have the honour to be, sir,
Your obedient servant,

C. J. FAGAN.

APPENDIX A.—INSPECTION OF LAGER BEER—Tabulated Statement.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.								Remarks of Analyst.	Name and Address of Vendor of Sample.
				Specific Gravity.			Proof Spirits, Vol., p.c.	Acidity (C.C.N. Alkali per 100 c. c. Beer).	Preservatives.	Ash.	Metallic Contamination.		
				Beer at 15°5c.	Distillate.	Dealcoholised residue.							
1900.	*Official Analyst, Dr. W. H. Ellis, Toronto.*						p. c.	c. c.		p. c.			
July 21	Lager Beer, Export, Pabst, Milwaukee.	12485	20740	1·0225	·9911	1.0280	7·10	2·5	None. ..	0·138	.....	Genuine ... ..:	L. Laberge, Ottawa.
" 24	Lager Beer, Capital Brewing Co., Ottawa.	12486	20741	1·0142	·9935	1·073	8·00	2·72	Contains salicylic acid.	.....	.....	....	F. C. Daniels "
" 24	Lager Beer, Imperial Club, The Carling Brewing and Malting Co.	12487	20742	1·0153	·9945	1·0207	6·72	2·02	" ..	... .	..... .	....	E. De Veaux "
" 24	Lager Beer, Sleeman, Export...	12488	20743	1·0157	·9934	1·0221	8·00	3·63	None.....	0·182	.....	Genuine.....	W. Clarke "
" 25	Lager Beer, Reinhardt, draught, Reinhardt & Co., Toronto.	12489	20744	.....	.....	....	...	.....	.....	0·20	1·5 mg. in 100c.c	This sample of draught beer was sour.	E. Robitaille "
" 25	Lager Beer, Salvador, Reinhardt & Co.	12490	20745	1·0141	·9939	1·0212	7·49	3·43	None.	0·204	.....	Genuine.....	W. Clarke "
" 31	Lager Beer, Special Export, Z. Kuntz, Waterloo, Ont.	12491	20746	1·0144	·9940	1·0203	7·23	3·23	"	0.210	.....	"	Vendor.
" 31	Lager Beer, Pilsener, C. N. Huelther, Berlin, Ont.	12492	20747	1·0123	·9941	1·0175	7·23	3·33	"	0·206	... .	"	"
" 31	Lager Beer, Export, Grants Spring Brewery, Hamilton.	12493	20748	1·0090	·9935	1·0153	8·00	3·63	"	0·208	.....	"	"
" 31	Lager Beer, H. Kuntz, Hamilton.	12494	20749	1·0087	·9929	1·0157	8·77	6·76	"	0·256	.....	"	"

APPENDIX B.—INSPECTION OF TEA—Tabulated Statement.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.								Remarks by Analyst.	Name and Address of Vendor of Sample.
				Extd. by ten minutes infusion.			Moisture.	Ash.			Sand, &c.		
				Total solids dissolved.	Tannin.	Theine.		Total.	Soluble.	Insoluble.			
1906.	*Official Analyst, W. Bowman, Halifax, N.S.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Aug 6	Tea, black	12830	16788	19·52	3·62	2·25	9·44	5·53	3·23	2·30	0·39	Of low grade, leaves broken, no foreign leaves or facing detected.	J. P. Wambolt, Halifax, N.S.
" 6	" "	12831	16789	19·50	4·29	2·24	10·48	6·31	3·68	2·63	0·43	" "	H. W. Wentzell & Co., Halifax, N.S.
" 6	" green	12832	16790	32·10	17·36	2·44	6·85	6·27	3·81	2·46	0·41	Unadulterated	A. P. Torrens, Halifax, N.S.
" 6	" "	12833	16791	31·91	13·26	2·65	7·18	6·05	4·20	1·85	0·20	"	W. C. Anderson, Halifax, N.S.
" 6	" black	12834	17724	19·90	6·24	2·34	10·32	5·78	3·78	2·00	0·24	Of low grade, leaves much broken, no foreign leaves or facing.	F. Goddard, St. John, N.B.
" 7	" "	12835	17725	17·10	5·07	2·20	10·90	6·17	3·80	2·37	0·37	" "	D. E. Loomer, St. John, N.B.
" 7	" "	12836	17726	27·96	12·48	2·42	8·67	6·02	3·70	2·32	0·38	Unadulterated, leaves broken, no foreign leaves detected.	G. M. & A. A. Barker, St. John, N.B.
" 7	" "	12837	17727	26·08	10·53	2·31	10·61	6·15	3·94	2·21	0·35	" "	G. L. P. Swetra, St. John, N.B.
	Official Analyst, Dr. F. X. Valade, Ottawa.												
" 2	Tea, green	14733	20733	35·98	11·10	2·57	4·00	5·73	3·41	2·32	0·38	Broken leaves, no dust, genuine.	A. E. Cowan, Ottawa.
" 2	" black	14734	20734	23·25	7·13	3·03	7·85	5·20	3·52	1·68	. . .	" "	Bryson, Graham & Co., Ottawa.
" 2	" "	14735	20735	27·10	7·68	3·32	8·30	5·47	3·77	1·70	0·03	" "	R. Barnes, Ottawa.
" 2	" "	14736	20736	21·40	7·25	3·04	8·64	5·14	3·22	1·92	0·11	No perfect leaves, no dust, genuine.	M. W. Sumner, Carleton Place.
" 2	" green	14737	20737	28·60	10·52	2·70	6·90	6·02	3·84	2·18	0·51	" "	A. Daron, Carleton Place.
" 2	" black	14738	20738	24·40	7·54	3·41	9·62	5·28	3·41	1·87	0·23	" "	R. E. Hicks, Perth, Ont.
" 2	" green	14739	20739	32·05	11·70	2·71	4·89	6·38	3·87	2·51	0·74	" "	Mrs. Powell "

APPENDIX B.—INSPECTION OF TEA—Tabulated Statement—*Continued.*

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.								Remarks by Analyst.	Name and Address of Vendor of Sample.
				Extd. by ten minutes infusion.			Moisture.	Ash.			Sand, &c.		
				Total solids dissolved.	Tannin.	Theine.		Total.	Soluble.	Insoluble.			
1901.	*Official Analyst, F. T. Harrison, London, Ont.*			p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.		
July 30	Tea, green	14238	19371	27·1	8·92	2·45	7·15	6·38	3·80	2·58	0·50	Leaves very much broken, no foreign leaves detected, genuine.	A. G. Ault, Seaforth, Ont.
" 31	" black	14239	19372	23·4	6·06	3·27	8·30	5·19	3·27	1·92	0·16	" "	S. A. Brubacher, Berlin, Ont.
" 31	" "	14240	19373	20·1	5·05	2·81	8·45	5·81	3·54	2·27	0·43	" "	A. M. Doerings, Waterloo, Ont.
Aug. 1	" green	14241	19374	27·9	10·43	2·56	6·20	6·38	3·47	2·91	0·90	Leaves in fair condition, no foreign leaves, apparently a little facing, genuine.	J. D. Elliott, Tottenham, Ont.
" 2	" black	14242	19375	20·0	3·88	2·53	9·05	4·99	2·80	2·19	0·51	No foreign leaves detected, but many stems, "woody," adulterated according to Departmental standard.	A. B. Wark, Hamilton, Ont.
" 3	" "	14243	19376	20·4	4·38	2·66	8·85	5·60	3·54	2·06	0·42	Leaves in small fragments, no foreign leaves, genuine.	M. McGuire & Co., St. Catharines, Ont.
" 3	" green	14244	19377	24·6	4·88	1·90	7·00	7·90	2·79	5·11	2·92	No foreign leaves but many stems, adulterated according to Departmental standard.	W. J. & J. McCalla, St. Catharines, Ont.
	Official Analyst, E. B. Kenrick, Winnipeg.												
Aug. 29	Tea, black	11442	17257	25·62	6·03	2·81	5·31	5·73	3·74	1·99	. . .	Genuine	A. McKinney, Winnipeg
" 29	" "	11443	17258	22·82	5·06	2·75	7·70	6·01	3·46	2·55	....	"	C. Reid "
" 30	" "	11444	17259	22·64	4·91	2·37	7·67	5·29	2·74	2·55	....	"	A. Laurens, Portage la Prairie.
" 30	" "	11445	17260	27·62	7·07	2·78	5·74	6·45	4·02	2·43	.....	"	J. O'Reilly, Portage la Prairie.
" 30	" "	11446	17261	22·51	4·68	2·55	6·30	5·66	3·35	2·31	... ..	"	J. E. Brown, Portage la Prairie.
" 30	" "	11447	17262	18·98	4·34	2·24	8·46	5·68	3·30	2·38	.....	"	Hudson's Bay Co., Portage la Prairie.

		Official Analyst, Dr. C. J. Fagan, Victoria, B.C.												
Aug.	9	Tea, black.....	16921	21515	.....	....	2·6	....	6·5	3·1	3·4	None.	"	.... G. W. Halliday, Vancouver, B.C.
"	9	"	16922	21516	.....	.....	1·9	....	5·8	2·8	3·0	"	"	.... F. Filion, Vancouver, B.C
"	9	"	16923	21577	....	....	2·6	....	4·8	3·2	1·6	"	"	.... H. Alberts "
"	9	Tea, green.....	16924	21518	....	....	2·03	....	5·8	3·2	2·6	"	"	.... H. W. Carlson "
"	9	"	16925	21579	.....	...	2·7	.....	5·6	3·6	2·0	"	"	.... C. Urchida "
"	9	"	16926	21520	.....	....	2·2	....	6·1	3·6	2·5	"	"	.... B. C. Supply Co. "

Date of Collection.	Description of Sample, together with name and address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and address of Vendor of sample.
				Alcohol by Weight.	Alcohol by Volume.	Metals.	Proof Spirits.	Metals. — Mgr. per Litre.		
1900.	*Official Analyst, M. Bowman, Halifax, N.S.*			p. c.	p. c.		p. c.			
Sept. 6	Ginger Beer, Sussex Mineral Spring Co.	12844	16792	2·33	2·93	Nil.			In good order and unadulterated.	J. Rooney, Kentville, St. John, N.B.
" 11	Ginger Beer, Whelan & Ferguson, Halifax.	12845	16793	0·53	0·66	"			" "	L. D. Munans, Gottingen St., Halifax, N.S.
" 11	Ginger Beer, Felix & Quinn, Halifax.	12846	16794	0·42	0·53	"			" "	M. Butler, Mark Wharf, Halifax.
" 7	Lemon Sour, Biglow & Hood, Truro, N.S.	12847	16795	Nil.	Nil.	Iron			" "	M. Carr, Windsor, N.S.
" 7	Lemon Sour, Vendor	12848	16796	"	"	Nil.			" "	Jas. Rowe, Halifax, N.S.
" 7	" "	12849	16797	"	"	"			" "	Thos. Chaldmers, Halifax, N.S.
" 7	" Vendors	12850	16798	"	"	Iron			" "	Biglow & Hood, Halifax, N.S.
" 4	Ginger Beer, Dolan Bros., St. John, N.B	12838	17728	1·37	1·73	Nil.			" "	E. Lawton, 27½ Prince William St., St. John, N.B.
" 4	" J. J. Ferrie, St. John, N.B.	12839	17729	1·37	1·73	"			" "	J. Lannen, 31 Water St., St. John, N.B.
" 4	Lemon Sour, Vendor	12840	17730	Nil.	Nil.	Iron			" "	Jas. Ready, Peel St., St. John, N.B.
" 6	Ginger Beer "	12841	17732	0·63	0·79	Nil.			" "	O. S. Leger, 50 Main St., Moncton, N.B.
" 6	Lemon Sour "	12842	17733	Nil.	Nil.	Iron			" "	Wm. Givans & Sons, Moneton, N.B.
" 7	Ginger Beer, S. H. McNee & Sons, 121 King St., Fredericton, N.B.		17734						" "	Thos. Flanigan, Wellington St., Chatham, N.B.
" 7	Lemon Sour, Sussex Mineral Spring Co., Sussex, N.B.	12843	17735	0·21	0·26	Nil.			" "	" "
	Official Analyst, Dr. M. Fiset, Quebec.									
" 6	Lemon Sour, H. Girouard & Co., Montreal.	13701	19962	0·11	0·13		0·23	Traces iron	Liquid clear; genuine	E. P. Dupras, 1690 Ontario St., Montreal.

"	6	Ginger Beer, R. Millar, Montreal....	13702	19963	0·63	0·79	.....	1·39	" ..	Liquid tastes and smells of ginger, and contains some sediment; genuine.	N. Tremblay, 315 Commissioners St., Montreal.
"	6	" Rowan & Bros., Montreal	13703	19964	0·63	0 79	....	1·39	" ..	" " ..	R. Coogan, 243 Commissioners St., Montreal.
"	7	Lemon Sour, J. H. Bryant, Sherbrooke	13704	19965	0·16	0·20	.....	0·35	Traces iron and lead.	Liquid tastes and smells of lemons, and contains no sediment; genuine.	J. A. McDonnell, King St., Sherbrooke.
"	7	Ginger Beer, S. C. Nuther, Sherbrooke	13705	19966	1·50	1·88	....	3·30	Traces iron.	Liquid tastes and smells of ginger, and contains some sediment; above British limit in alcohol; 2 p. c. proof spirit.	" "
"	8	" P. O. Milloy, Montreal..	13707	19968	0·63	0·79	.....	1·39	Traces lead.	Liquid tastes and smells of ginger, and contains some sediment; genuine.	T. Belanger, 2040, St. Catherine St., Montreal.
"	8	" Gurd & Co., Montreal...	13708	19969	2·00	2·51	.....	4·40	Traces iron and lead.	Liquid tastes and smells of ginger, and contains some sediment; much above British limit (2 p. c. proof spirit) in alcohol.	A. Sicotte, 657 Dorchester St., Montreal.
"	17	" M. Timons & Sons, Quebec	13709	19970	0·21	0·26	.. ..	0·46	Traces iron.	Liquid tastes and smells of ginger, and contains some sediment; genuine.	Geo. Lemelin, 1st Joseph St., Quebec.
"	17	" A. Crawford, Quebec ...	13710	19971	0·68	0·86	. ...	1·51	" ..	" " ..	M. A. Bryant, St. Paul St., Quebec.
"	17	" J. Coté, Quebec.	13711	19972	0·21	0·26	.....	0·46	" ..	" " ..	J. Champaquat, St. Paul St., Quebec.
"	18	" J. Rousseau..... ...	13712	19973	1·25	1·57	....	2·75	Traces iron, lead 4.	Liquid tastes and smells of ginger, and contains some sediment; above British limit (2 p. c. proof spirit) in alcohol; slightly contaminated with lead; traces sulphates present.	C. Thibault, Victoriaville.
"	24	" Goulet Bros., Montreal..	13713	19974	0·16	0·20	... ...	0·35	Lead 17....	Liquid tastes and smells of ginger, and contains some sediment; contaminated with lead.	M. L. Denis, 2200 Notre Dame St., Montreal.
"	25	" Robt. Allan, Montreal...	13714	19975	1·31	1·65	..... .	2·89	Lead 5, trac. iron.	Liquid tastes and smells of ginger, and contains some sediment; above British limit in alcohol; slightly contaminated with lead.	M. Patenaude, 1738 St. Catherine St., Montreal.
"	25	" J. Christin & Co., Montreal	13715	19976	0·79	0·99	....	1·74	Lead 13, trac. iron.	Liquid tastes and smells of ginger, and contains some sediment; contaminated with lead.	A. Bolinini, 1321 St. Catherine St. Montreal.

APPENDIX C.—INSPECTION OF AERATED WATERS—Tabulated Statement—*Concluded.*

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Alcohol by Weight.	Alcohol by Volume.	Metals.	Proof Spirits.	Metals. — Mgr. per Litre.		
1900.	*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.		p. c.			
Aug. 31	Ginger beer, McLaughlin & Co., Toronto.	14740	20750	1·69	.....	None.....	...	....	No gas; the bottle was only one-fourth full; doubtful; the percentage of alcohol is rather high.	S. Mills, O'Connor St., Ottawa.
" 31	" E. Hall, Ottawa.....	14741	20751	1·37	.....	" ..	.....	..... .	Doubtful; the percentage of alcohol is rather high.	" " "
" 31	" Huckell & Co., Ottawa.	14742	20752	0·53	....	"	...	. ...	Genuine.....	S. Daniels, Metcalfe St. "
" 31	" E. Mireault, Ottawa....	14743	20753	1·06	. ..	Faint tr'ce of tin.	....	....	"	S. W. Lee, Elgin St. "
" 31	" F.M.Pilgrim, Brockville	14744	20754	0·95	....	None.....	..	.....	"	W. R. Queale, "The Bodega," Elgin St., Ottawa.
Sept. 1	" Gurd, Montreal.....	14745	30755	0·39	.....	"	.	.....	"	Gilmour Hotel, Bank St., Ottawa
" 1	Lemon sour, F.M.Pilgrim, Brockville	14746	20756	0·74	.....	"	.....	....	"	S. Mills, O'Connor St. "
" 1	" E. Mireault, Ottawa....	14747	20757	0·74	.....	"	.....	....	"	S. W. Lee, Elgin St. "
" 1	" Huckell & Co. "	14748	20758	1·06	.....	Doubtful trace of lead.	.....	....	"	S. Daniels, Metcalfe St. "
" 1	" Mineral Water Co., Arnprior.	14749	20759	1·06	.....	None....	.....	.....	"	F. Boissio, 215 Bank St. "
" 1	" R. Irvine, Ottawa	14750	20760	0·53	.....	"	.....	....	"	Piller, 607 Somerset St. "
" 1	" " "	14751	20761	0·65	.....	"	.....	.. . .	"	F. Lavorato, Bank St. "
	Official Analyst, Dr. W. H. Ellis, Toronto.									
" 5	Ginger beer, Vendor	12495	20764	1·014	.....	None.....	.... .	... .. .	....	R. Irvine, Smith's Falls.
" 5	Lemon sour "	12496	20765	None.	.....	Trace iron	. ...	.....	....	" "
" 6	" D. Knox, Peterboro'....	12497	20766	" .	.....	" ..	...	.....	.. ..	G. Graham, Oriental Hotel, Peterboro'.
" 6	Ginger beer, James "	12498	20767	0·21	.....	None.....	.....	....	....	" " "
" 6	Ginger ale, Pilgrim, Hamilton.....	12499	20768	None.	...	Trace iron	.....	.....	..... .	Brown & Co., grocers, Peterboro'.

"	6	Lemon sour	"	"	12500	20769	"	"	"			" " "
"	7	"	McLaughlin & Co., Toronto		16001	20770	"	"	"			J. J. Scanlon, cor. York and Wellington Sts., Toronto.
"	7	"	C. Wilson, Toronto		16002	20771	"	"	"			" " "
"	7	Ginger beer	"	"	16003	20772	0·63	None				J. Venn, York St. "
"	8	"	Vendor		16004	20773	0·20	"	"			" " "
"	8	Lemon sour	"		16005	20774	None.	Trace iron				J. Dodds, Seaforth, Ont.
"	10	Ginger beer	"		16006	20775	1·25	None				" "
1900.		*Official Analyst, F. T. Harrison, London, Ont.*										D. Ferguson, London.
Sept.	4	Lemon sour,	A. Brown, Brampton		14245	19378	Trace	Trace	Trace of tin.	Trace		Not adulterated. A. Henderson, Brampton.
"	4	Ginger beer	"	"	14246	19379	0·11	0·13	None	0·23		" E. J. Packham "
"	5	"	W. Watkinson, Guelph.		14347	19380	1·80	2·26	"	3·97		" D. Martin, Guelph.
"	5	"	Vendor		14348	19381	0·72	0·92	"	1·59		" W. Matthews "
"	5	Lemon sour	"		14349	19382	None.	None.	None	None.		" " "
"	6	Ginger beer,	H. Wilkinson, Stratford		14350	19383	1·43	1·80	"	3·14		" Walsh Bros., Stratford.
"	6	Lemon sour	"	"	14351	19384	None.	None.	"	None.		" " "
"	6	Ginger beer,	Vendor		14352	19385	0·11	0·13	None	0·23		" J. Bilton, 263 Dundas St., London, Ont.
"	6	Lemon sour	"		14353	19386	Trace	Trace	None	Trace		" " "
"	7	"	"		14354	19387	None.	None.	None	None.		" J. Tune & Son, York St., London, Ont.
		Official Analyst, Prof. E. B. Kenrick, Winnipeg.										
Sept.	28	Lemon sour,	Vendor		11448	17263	None.		None			Genuine E. L. Drewry, Winnipeg.
"	29	"	"		11449	17264	"		"			" The Blackwood Co., Limited, Winnipeg.
"	29	"	"		11450	17265	"		"			" O'Kelly Bros, Winnipeg.
"	29	"	E. L. Drewry, Winnipeg		11451	17266	"		"			" J. W. Carson "
"	28	Ginger beer	"		11452	17267	"		"			" E. L. Drewry "
"	28	"	"		11453	17268	1·71		"			" " "
"	28	"	Vendors		11454	17269	1·71		"			" The Blackwood Co., Limited Winnipeg.
"	29	"	The Blackwood Co		11455	17270	1·71		"			" Andrew Ferguson, Winnipeg.

APPENDIX D.—INSPECTION OF POTTED

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of			
				Moisture.	Fat.	Total Nitrogen.	Caseine.
1900.	*Official Analyst, M. Bowman, Halifax, N.S.*			p. c.	p. c.	p. c.	p. c.
Sept 28	Potted Cream Cheese, McLaren, Toronto.....	12881	19982	29·87	35·52	3·99	24·94
Oct. 3	Potted Cream Cheese, Royal Cream Brand, Regal Cream Cheese Co., Charlottetown, P.E.I.	12876	17737	32·84	30·36	4·16	26·01
" 3	Potted Cream Cheese, Rosemary Cream Brand, L. S. Rosemary Co., Hamilton, Ont.	12877	17738	27·52	39·04	4·76	29·76
Sept. 27	Potted Cream Cheese, Royal Oxford, Oxford Cheese Co., Woodstock, Ont.	12882	20779	34·23	33·64	3·75	23·44
" 27	Potted Cream Cheese, Imperial, A. F. MacLaren, Toronto.	12883	20782	28·12	35·57	3·67	22·94
" 27	Potted Cream Cheese, Roquefort Extra Fine, Cole Butter and Cheese Co., Ottawa.	12884	20786	30·61	15·08	5·47	34·19
Oct. 1	Potted Cream Cheese, Bayley's Devilled, Bayley, St. Louis, Mo., U.S.A.	12885	20787	42·69	27·78	3·42	21·38
" 3	Potted Cream Cheese, Imperial, A. F. MacLaren.	12878	19396	29·83	34·10	3·97	24·82
" 4	Potted Cream Cheese, Ingersol Packing Co., Ont.	12879	19398	31·89	30·08	5·07	31·69
" 4	Potted Cream Cheese, Star Cream, F. H. Fearman, Hamilton.	12880	19399	21·16	37·69	5·53	34·57
	Official Analyst, Dr. W. H. Ellis, Toronto.						
Sept. 4	Potted Cream Cheese, Cream Cheese, Regal Cream Cheese Co., Charlottetown, P.E.I.	16015	20001	29·71	40·56	4·74	29·62
" 4	Potted Cream Cheese, Cream Cheese, A. F. MacLaren, Toronto.	16016	20008	29·53	36·48	4·75	29·68
" 10	Potted Cream Cheese, Roquefort Cheese, A. F. MacLaren, Toronto.	16012	19988	30·78	39·32	4·95	30·93
" 11	Potted Cream Cheese, Trappist Fathers, Oka, Que.	16013	19989	34·34	33·81	4·89	30·56
" 12	Potted Cream Cheese, not known.	16017	19990	52·66	24·54	3·67	29·93
" 11	Potted Cream Cheese, Oxford Cheese Co., Woodstock, Ont.	16018	19991	31·73	34·11	4·85	30·31
" 12	Potted Cream Cheese, Potted Cheese, Ingersol Packing Co.	16014	19398	31·27	34·32	5·02	31·37
" 12	Potted Cream Cheese, the L. S. Rosemary Co., Hamilton.	16009	17280	30·78	35·29	4·66	29·12
" 12	Potted Cream Cheese, A. F. MacLaren..	16010	17281	29·77	36·99	4·59	28·68
" 12	" " "	16011	17282	31·89	38·11	4·15	25·93
	Official Analyst, Dr. C. J. Fagan, Victoria, B.C.						
Dec. 19	Cream Cheese, A. F. McLaren, Toronto.	16951	21521	32·7	32·	3·6	22·5
" 19	" Millar Co., Ingersol, Ont ..	16950	21522	28·2	34·1	3·9	24·3
" 20	" Eby Blain, Toronto..... ...	16949	21523	20·2	36·2	4·5	28·1
Jan. 22	" Martin Fensier & Co., San Francisco.	16948	21543	43·9	27·5	3·8	23·7
" 22	" Getz Bros., San Francisco.....	16947	21544	50·5	23·0	3·	18·7

CREAM CHEESE—Tabulated Statement.

Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
C. C. Decinormal Ammonia for 5 grms. Fat Reichert's Test.	Salt.	Preservative.	Boracic Acid.		
	p. c.	p. c.	p. c.		
26·41				Adulterated; being deficient in butter fat.	Wood Bros., St. Lawrence St., Montreal.
27·28				" "	Puddington & Meritt, 55 Charlotte St., St. John, N.B.
21·99				That presence of fat, other than that of butter, is doubtful, but is adulterated, being deficient in butter fat.	Vanwart Bros., cor. Duke and Charlotte Sts., St. John, N.B.
24·07				" "	W. Cunningham, Rideau St., Ottawa.
27·51				Adulterated; being deficient in butter fat.	A. E. Cowan, Sparks St., Ottawa.
				" "	R. McGregor "
27·05				" "	C. Stratton, 99 Lyon St., Ottawa.
28·20				" "	S. A. Benbacker, Berlin, Ont.
				" "	Jackson & Son, Guelph.
				" "	Jas. Patterson, Fergus.
	1·34	None		Rather low for a cream cheese	J. L. Archibald & Son, Halifax, N.S.
	2·02	"		Genuine	W. C. Anderson, Halifax, N.S.
	1·74	"		"	J. Duncan, St. Joseph St., Lachine, Que.
	1·45	"		"	F. Marchand, Richelieu St., St. Johns, Que.
	1·01	"		The fat is too low for a cream cheese	W. McCowan & Son, 337 St. Lawrence St., Montreal.
	1·89	"		Genuine	F. X. St. Charles & Co., 255 St. Lawrence St., Montreal.
	1·82	"		"	Jackson & Son, Guelph.
	1·48	"		The fat is too low for a cream cheese	Jackson & Campbell, Winnipeg.
	5·31	"		Genuine " "	" "
	3·96	"		Genuine; fat below average for cream cheese.	" "
	None		None	Genuine	Pantry Grocery, Vancouver, B.C.
	"		"	"	Ideal Grocery "
	"		"	"	Foran & Frost "
	"		"	"	Mowat & Wallace, Victoria, B.C.
	"		"	"	Erskine, Wall & Co. "

APPENDIX E.—INSPECTION

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Moisture.	Ash, Total.	Ash.	
						Insoluble.	Soluble in Hcl.
1900.	*Official Analyst, F. T. Harrison, London, Ont.*			p. c.	p. c.	p. c.	p. c.
Oct. 3	Cocoa, John P. Mott & Co., Halifax, N.S.....	14257	17739	7·30	5·72	3·13	0·13
" 1	" Cowan & Co., Toronto	14261	19986	3·65	3·93	1·25	0·11
Sept. 27	" Webb, Milton, Mass.....	14262	20783	5·50	8·65	4·55	1·15
Oct. 1	" Cowan & Co., Toronto....	14263	20788	6·70	5·50	1·19	0·15
" 1	" " "	14258	19391	4·20	2·34	1·04	0·17
" 3	" Webb, Milton, Mass....	14259	19395	6·00	9·95	5·10	1·70
" 4	" Todhunter & Mitchell, Toronto.....	14260	19397	3·75	1·80	0·65	0·05

OF COCOA—Tabulated Statement.

Fat.	Cane Sugar.	Theobromine.	Caffeine.	Remarks by Analyst.	Name and Address of Vendor of Samples,
p. c.	p. c.	p. c.	p. c.		
19·00	None.	1·50	0·84	Adulterated by abstraction of fat. The caffeine would indicate an admixture, but I failed to find any indication of it microscopically.	Baird & Peters, 20 Ward St., St. John, N. B.
12·42	32·48	0·78	0·18	Adulterated, being deficient in fat and contains sugar and fat.	Massicotte & Co., 1470 St. Catherine, Montreal.
17·02	None.	1·08	0 26	Adulterated by abstraction of fat...	A. E. Cowan, Sparks St., Ottawa.
32·40	"	1·20	0·20	Has a portion of the fat removed...	G. Miller, O'Connor St., Ottawa.
7·40	42·13	0·50	0·18	Adulterated, being deficient in fat and by addition of sugar starch.	B. B. Gunn, Seaforth, Ont.
18 06	None.	1·08	0·28	Adulterated by abstraction of fat...	Dunke & Co., Berlin, Ont.
20·00	31·40	0·56	0.10	Adulterated by addition of sugar and flour.	Scroggie Brothers, Guelph, Ont.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of					
				Loss at 100° C.	Total Solids.	Invert Sugar.	Cane Sugar.	Total Sugar.	Gelatine.
1900.	*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Oct. 3	Jam, Plum, Southwell & Co., London, Eng.	14753	17740	.....	78·47	48·82	23·63	72·45	None.
Sept. 28	Jam, Plum, G. Perreault, Montreal.....	14758	19980	.....	71·27	61·37	4·76	66·13	"
" 28	Jam, Strawberry, G. Perreault, Montreal.	14759	19981	.....	70·97	53·62	18·27	71·89	"
" 29	Jam, Raspberry, Asiatic Trading Co., Montreal.	14760	19983	.....	78·81	52·62	18·27	70·89	"
" 29	Jam, Strawberry, Montreal Canning Co..	14761	19984	....	63·93	45·27	11·53	56·80	"
" 29	Jam, Plum, Montreal Canning Co.. . .	14762	19985	.....	61·26	54·08	3·13	57·21	"
Oct. 1	Jam, Strawberry, J. Lamoureau, labelled Western Fruit Pkg. Co.	14763	19987	.....	70·69	61·26	4·42	65·68	"
Sept. 27	Jam, Black Raspberry, vendor.....	14764	20781	....	64·53	47·38	7·13	54·51	"
" 27	Jam, Plum, T. O. Lytle & Co., Toronto..	14765	20784	.....	67·25	37·72	24·42	62·14	"
" 27	Jam, Strawberry, T. O. Lytle & Co., Toronto.	14766	20785	.....	62·46	44·88	11·16	56·04	"
Oct. 2	Jam, Raspberry, T. Upton & Co., Hamilton.	14754	19392	...	72·33	40·46	24·72	65·18	"
" 2	Jam, Plum, T. Upton & Co., Hamilton..	14755	19393	.....	73·22	61·28	6·73	68·01	"
" 2	Jam, Gooseberry, T. Upton & Co., Hamilton.	14756	19394	.....	71·46	56·62	10·73	67·35	"
" 5	Jam, Strawberry, Toronto Biscuit Co....	14757	19402	....	72·69	60·49	4·57	65·06	"
	Official Analyst, Prof. E. B. Kenrick, Winnipeg.								
" 4	Jam, Raspberry, Upton & Co., Hamilton.	11464	20002	...	70·88	.....	....	65·04	None.
" 4	Jam, Strawberry, The Simcoe Canning Co, Simcoe, Ont.	11465	20004	.....	69·19	.....	. ..	64·53	" .
" 5	Jam, Strawberry, Woodstock Pure Food Co., Woodstock, N.B.	11466	20006	.....	62·15	..	...	60·01	" .
" 5	Jam, Plum, The Simcoe Canning Co... .	11467	20007	.....	66·40	.....	.....	51·33	" .
" 9	Jam, Strawberry, Maritime Pure Food Co., Woodstock, N.B.	11462	17741	.....	61·49	.....	....	53·75	" .
" 10	Jam, Plum and Damson, Ayr Preserving Co., Ayr, Mass., U.S.A.	11463	17743	... .	70·04	.....	.....	62·70	None.
" 1	Jam, Strawberry, T. A. Lytle & Co., Toronto.	11468	20790	.. ...	72·63	....	.....	65·14	" .
" 1	Jam, Plum, The Canada Preserving Co., Hamilton.	11469	20791	....	68·72	.....	.....	50·25	" "

SESSIONAL PAPER No. 14

OF JAM—Tabulated Statement.

Analysis.							Remarks by Analyst.	Name and Address of Vendor of Sample.
Foreign Colouring.	Antiseptics.	Fruit true to name.	Fruit of good quality.	Insoluble in water.	Ash.	Metallic Contamination.		
None	None	Correct.	Good.				Unadulterated	W. O. Porter, 215 Union St., St. John, N.B.
Slight trace.	"	Prunes..	Poor				Of poor quality. The presence of prunes gives an undesirable appearance to the jam.	A. Lacombe, 2507 Notre Dame St., Montreal.
Slight amt., probably magenta.	"	Not	Good.				Raspberry with apple tissue and plum. Adulterated.	" "
None	"	Correct.	"				Unadulterated	L. P. Forrest, 1976 St. Catherine St., Montreal.
Very slight trace.	"	"	"				"	A. Renaud & Co., 512 Craig St., Montreal.
Present	"	"	"				" but stained	" "
Very faint trace.	"	Not	"				Some apple, some strawberry and one fig seed. Adulterated.	A. Lamendeau & Père, Montreal.
None	"	Correct.	"				Unadulterated	R. Barnes, Rideau St., Ottawa.
"	"	"	"				"	Gilmour House Grocery, Ottawa.
Small amt., & probably magenta.	Salicylic acid	Not	"				Chiefly apple jam. Adulterated.	" "
Very small quantity.	None	Raspberries & apples	"				Very few raspberry seeds. Much peachy-like apple pulp. Adulterated.	A. G. Lloyd, Stratford.
None	"	Correct.	"				Unadulterated	Barnsdale Trading Co., Stratford.
"	Considerable quantity salicylic.	"	"				Adulterated. Containing a certain amount of salicylic acid.	Dunke & Co., Berlin, Ont.
Trace of aniline colour.	"	"	"				" "	Jno. McKim, Orangeville.
Probably present.	None found.	Yes	Yes				Probably adulterated	W. J. Hopgood, Halifax, N.S
"	"	"	"				Apple tissues, adulterated..	C. S. Davis, Halifax, N.S.
Doubtful	"	"	"				Genuine	De Wolf & Lamon, Kentville, N.S.
"	"	"	"				Doubtful	Stroud Bros., Windsor, N.S.
None	"	"	"				Genuine	W. R. Logan, Queen St., Fredericton, N.B.
Probably present.	"	"	"				Stated on pot to contain 25 per cent of apple.	G. M. & A. A. Barker, Queen St., Fredericton, N.B.
Doubtful	"	"	"				Doubtful..	Baird & Riddell, Carleton Place, Ont.
Probably present.	"	"	"				"	Mrs. A. Dares, Carleton Place, Ont.

APPENDIX F.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample	Result					
				Loss at 100°c.	Total Solids.	Invert Sugar.	Cane Sugar.	Total Sugar.	Gelatine.
1900.	*Official Analyst, Prof. E. B. Kenrick, Winnipeg.*—Con.			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Oct. 10	Jam, Raspberry, Toronto Biscuit Co.	11458	17276	.....	66·45	.....	....	60·43	None.
" 10	Jam, Strawberry, Thos. Upton, Hamilton.	11459	17277	.....	69·13	....	.....	63·97	" .
" 10	Jam, Strawberry, The Dyson Gibson Co., Winnipeg.	11460	17278	. ...	70·19	.....	. ....	65·52	" .
" 10	Jam, Plum, vendors.....	11461	17279	. . .	75·23	.....	.....	65·04	" .
	Official Analyst, Dr. C. J. Fagan, Victoria, B.C.								
July 18	Jam, Raspberry, Simcoe Canning Co.	15093	21508	28·5	.....	39·7	2·5	... .	. . .
" 19	Jam, Black Currant, Toronto Packing Co.	15095	21509	27·6	... ..	38·4	3·1	.....	...
" 20	Jam, Plum, Dyson Gibson Co., Winnipeg	15010	21510	26·3	.....	40·00	5·1	.....	....
" 20	Jam, Raspberry, T. A. Lytle, Toronto...	15094	21511	27·00	.....	40·00	12·00	.....	.... .
" 31	Jam, Peach, M. Lefebvre, Montreal	15098	21512	27·8	.. .	32·0	19·0	.....	.....
" 31	Jam, Strawberry, O'Kell & Monis, Victoria.	15097	21513	24·00	...	43·1	15·6	.....	. ....
" 31	Jam, Raspberry, Climax Preserving and Packing Co., Vancouver.	.....	21514	24·7	....	32·0	35·5	. ..	....

SESSIONAL PAPER No. 14

JAM—Tabu'ated Statement—*Continued.*

OF ANALYSIS.							Remarks by Analyst.	Name and Address of Vendor of Sample.
Foreign Colouring.	Antiseptics.	Fruit true to name.	Fruit of Good Quality.	Insolubles in water.	Ash.	Metallic Contamination.		
Doubtful....	None found.	Yes...	Yes ..	....	.... ..		Apparently genuine	R. Fairley, Winnipeg.
Probably present.	" ..	Unable to say.	...	....			Sold as strawberry jelly. The colouring matter appears to be identical with that of the two samples of raspberry jam Nos. 17276 and 20002.	P. Minark.
Doubtful....	" ..	Yes ..	Yes ..	....	.....		Doubtful. ... .'.	J. Coltart.
" ...	" ..	" ..	" ..	....	.....		"	The Blackwood's, Ltd.
None.....	.....	.....	... .	2·41	0·46	None.	Genuine	Wilson Bros., Victoria, B.C.
"	.....	. ...	.	1·74	0·59	" .	"	Hardress Clarke, Victoria, B.C.
"	....	.....	....	0·72	0·21	" .	"	Johns Bros., Victoria, B.C.
Magenta ...	.....	....	.....	3·92	0·39	" .	Adulterated with magenta.	G. E. Munroe & Co., Victoria, B.C.
None.	.....	....	....	4·21	....	" .	Genuine	H. Hesson, Vancouver.
"	....	.. ...	.... .	1·91	0·41	" .	"	S. Fades & Co., Vancouver.
"	. .. .	. ...	.....	2.45	0·26	" .	"	Carmichael & Dickie, Vancouver.

APPENDIX G.—INSPECTION OF PICKLES—Tabulated Statement

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Acetic Acid in the liquid of the pickles. Grms. per 100 C. C.	Sulphuric Acid.	Alumina.	Free Mineral Acid.	Metals.		
1900.	*Official Analyst, Dr. M. Fiset, Quebec.*			p. c.	p. c.	p. c.				
Oct. 4	Mixed Pickles, Davidson Bros., Halifax, N.S.	13723	20005	1·86	0·08	0·04	None	Trace copper	Some of the vegetables too ripe when pickled, but well preserved; a little copper present; doubtful.	C. S. Davis, Halifax.
" 3	Pickles, Mixed, Sun Brand, Brosseau & Co., Montreal.	13716	17736	1·75	0·06	0·03	....	None	" genuine.....	Baird & Peters, 16 Maud St., St. John, N.B.
Sept. 28	Pickles, Mixed, Klondike, J. Lambert, Montreal.	13719	19977	1·66	0·05	0·02	.....	"	Genuine.....	J. Dion, 2582 Notre Dame, Montreal.
" 28	Pickles, Mixed, Royal, G. Perreault, Montreal.	13720	19979	1·59	0·03	Trace	.....	"	"	O. Lacombe, 2567 Notre Dame, Montreal.
" 27	Pickles, Mixed, Sun Pickle Works, London, Ont.	13721	20780	2·05	0·03	"	.....	"	"	T. R. Davies, Rideau St., Ottawa.
Oct. 1	Pickles, Mixed, Canada Pickling Co., Toronto.	13722	20789	2·30	0·07	0·01	.....	"	"	Baird & Riddell, Carleton Place.
" 4	Pickles, Mixed, H. P. Eckhardt & Co., Toronto.	13717	19400	1·16	0·06	0·02	.....	"	" but not in good condition.	Armstrong Bros., Fergus, Ont.
" 5	Pickles, Mixed, E. Blain & Co., Toronto.	13718	19401	2·08	0·06	0·03	.....	"	"	S. Donner, Orangeville.
" 9	Pickles, Mixed, White Star, The Dyson, Gibson Co., Winnipeg.	13724	17273	2·34	0·15	0·05	.....	Trace copper	Doubtful.	R. J. Gallagher, Winnipeg.
" 9	Pickles, Mixed, Blackwood's, The Blackwood Co., Ltd., Winnipeg.	13725	17274	2·60	0·05	Trace	.....	None	Genuine.....	W. B. Francis, Winnipeg.

APPENDIX H.—INSPECTION OF SALTPETRE—Tabulated Statement.

Date of Collection.	Description of Sample, together with name and address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and address of Vendor of sample.
				Moisture.	Soda, Na_2O.	Potash.	Nitrogen.	Impurities.		
1901.	*Official Analyst, M. Bowman, Halifax, N.S.*			p. c.	p. c.	p. c.	p. c.	p. c.		
Jan. 29	Saltpetre, Brown & Webb, Halifax	12905	20026	0·18	2·86	43·47	13·16	.....	Unadulterated, contains a trace of chloride also of soda.	M. D. Logan, druggist, Halifax.
" 29	" Simpson Bros "	12906	20027	0·13	5·35	40·82	12·57	.....	Adulterated, containing a considerable amount of chloride also soda.	Hattie & Mylins "
" 29	"	12907	20028	0·07	. ...	.....	12·66	.....	Unadulterated	C. E. Huggins "
" 25	" Andrews & Co., Liverpool, E	12908	17763	0·55	.....	....	12·18	.....	Adulterated, containing a considerable amount of chloride.	Bowman & Angivine, grocers, 28 Water St., St. John, N.B.
" 29	" T. B. Barker & Son, St. John	12909	17765	0·19	0·21	46·30	13·24	.....	Unadulterated, contains a trace of chloride.	R. T. Mack, druggist, Queen St., Fredericton, N.B.
	Official Analyst, Dr. M. Fiset, Quebec.									
" 25	Saltpetre, Kerry Watson Co	13763	18986	0·14	None.	46·46	13·82	.....	Genuine saltpetre	J. A. Pelletier, druggist, Three Rivers, P.Q.
" 25	" "	13764	18987	0·08	"	46·31	13·79	.....	"	R. W. Williams, druggist, Three Rivers, P.Q.
" 29	"	13767	18990	0·53	36·44	None.	16·45	.....	Adulterated, being nitrate of soda.	A. A. J. Gingras, grocer, 55 Dominique St., Quebec.
" 29	" E. Morin, Quebec	13768	18991	0·44	36·41	"	16·44	.....	" "	J. B. Morin, druggist, 325 St. Joseph St., Quebec.
" 30	" Kerry, Watson Co	13771	18994	0·09	None.	46·40	13·81	.....	Genuine	J. B. Morin, druggits, Levis.
	Official Analyst, Dr. F. X. Valade, Ottawa.									
" 9	Saltpetre	14801	20541	0·022	....	46·17	13·72	.....	Good	Nolan & Payment, druggists, cor. Division and Wellington Sts., Ottawa.
" 9	"	14802	20542	0·038	.....	46·36	13·86	.....	"	Skinner & Co., druggists, Ottawa
" 9	"	14803	20543	0·022	.....	46·12	13·78	.....	"	Graham & Elliott "

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Moisture.	Soda Na_2O.	Potash.	Nitrogen.	Impurities.		
1901.	*Official Analyst, Dr. F. X. Valade, Ottawa.*			p. c.	p. c.	p. c.	p. c.	p. c.		
Jan. 9	Saltpetre	14804	20544	0·656	34·22	1·58	15·68	Magnesia present.	Mainly nitrate of soda and having been sold as saltpetre is adulterated according to the Act.	Hand & Phillips, grocers, cor. Somerset and Division Sts., Ottawa.
" 9	"	14805	20545	0·024	32 67	2·93	15·40	"	" "	R. Baird, grocer, cor. Somerset and Percy Sts., Ottawa.
	Official Analyst, Dr. W. H. Ellis, Toronto.									
" 22	Saltpetre, Stinson & Co., Kingston	16053	20550	....	37·36	....	14·96	.....	Nitrate of soda and therefore adulterated if sold as saltpetre.	J. W. Harrison, druggist, Gananoque.
" 22	" Lyman Knox, Toronto	16054	20551	.....	.....	45·89	13·66	.....	Genuine	A. W. Gauge & Bro., druggist, Gananoque.
" 23	"	16055	20552	.....	34·90	2·47	14·73	.....	Adulterated by admixture with about 85 p. c. of sodium nitrate.	Joy & Perry, grocers, Napanee.
" 24	" Lyman Bros., Toronto	16056	20553	....	.....	45·90	12·87	.....	Genuine	J. R. Bound, druggist, Yonge St., Toronto.
" 24	" Not known	16057	20554	.....	.....	46·76	13·45	.....	"	John Giles, grocer, Toronto.
	Official Analyst, F. T. Harrison, London, Ont.									
" 17	Saltpetre, Lyman Bros., Toronto	14294	19435	0·35	Trace.	46·35	13·80	Trace.	Contains a trace of chlorides; unadulterated.	W. A. Karn, druggist, Woodstock, Ont.
" 17	" W. G. Coles, Broker, London, Ont.	14295	19437	0·05	36·29	Trace.	16·39	None.	Considerable trace of chlorine; adulterated, being nitrate of sodium and not nitrate of potassium.	Scandrett Bros., grocers, 175 Dundas St., London, Ont.

"	18	"	14296	19440	0·60	36·41	None.	16·44	"	Traces of chlorides; adulterated, being nitrate of sodium and not nitrate of potassium.	G. H. Nairn, grocer, Windsor, Ont.
"	18	" London Drug Co....	14297	19442	0·05	None.	46·51	13·85	"	Unadulterated; this is a very pure sample.	J. E. A. Vignon, druggist, Windsor, Ont.
		Official Analyst, Prof. E. B. Kenrick, Winnipeg.									
"	23	Saltpetre, The Martin Bole, Wynne Co., Winnipeg.	17011	17304	0·26	36·45	None.	16·46	None.	Pure nitrate of soda, but having been sold as saltpetre is adulterated according to the Act.	C. T. Hassefield, druggist, Winnipeg.
"	23	" The Bole Drug Co.....	17012	17305	0·04	None.	46·63	13·89	"	Genuine	J. A. Snider, druggist, Winnipeg.
"	24	" Campbell Bros. & Wilson, Winnipeg	17013	17306	0·06	36·50	None.	16·50	"	Pure nitrate of soda, but having been sold as saltpetre is adulterated according to the Act.	W. H. McLean, grocer, Winnipeg.
"	24	" The A. Macdonald Co., Winnipeg..	17014	17307	0·06	36·38	"	16·44	Traces of iron.	" " ..	Jackson & Campbell, grocers, Winnipeg.
		Official Analyst, Dr. C. J. Fagan, Victoria, B.C.									
Feb.	14	Saltpetre, Pure Gold Manufacturing Co., Montreal.	16964	21549	0·57	46·08	25·27	17·9	....	A mixture of soda saltpetre and saltpetre, and is adulterated if sold as saltpetre.	L. Dickinson, grocer, Victoria.
"	14	" Gillet & Co., Toronto..	16965	21551	2·5	.....	76·25	16 9	.....	Genuine	John Cochrane, druggist, Victoria.
"	16	" Uncertain.....	16966	21556	0·17	.....	78·3	17·5	.....	"	McDowell & Watson Co., druggists, Vancouver.
"	16	" A. Wilson & Co., Hamilton	16967	21558	3·7	65·74	....	17·1	.....	A soda saltpetre and is adulterated if sold as saltpetre.	Dr. J. McAlpin, druggist, Vancouver.

APPENDIX I.—INSPECTION OF BORAX—Tabulated Statement.

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
				Total Water by ignition.	Total alkalinity (as Na_2O).	Carbonic Acid.	Soda combined therewith.	Impurities.		
1901.	*Official Analyst, M. Bowman, Halifax, N.S.*			p. c.	p. c.	p. c.	p. c.	p. c.		
Jan. 29	Borax, Pure Gold Manufacturers, Co., Toronto.	12887	20029	43·32	17·59	Nil...	Nil...	.....	Unadulterated; has been partially dried.	T. F. Courtney & Co., grocer, Halifax
" 29	" Brown & Webb	12888	20030	47·00	16·37	" ...	" ...	.....	Unadulterated.....	Jas. McFatridge, druggist "
" 22	" Imported from London, Eng..	12889	17761	47·00	16·37	" ...	" ...	.....	"	The Canadian Drug Co., Ltd., 60 Prince Wm. St., St. John, N.B.
" 23	" T. B. Barker & Son, Limited, St. John.	12890	17762	46·99	16·37	" ...	" ...	.....	"	T. E. Williams, grocer, cor. Princess and Charlotte Sts., St. John, N.B.
" 29	" The Oriental Co., 33 Front St. E., Toronto.	12892	17764	43·57	24·77	14·90	20·84	....	Adulterated being largely composed of sodium carbonate.	E. H. Boone, grocer, Queen St., Fredericton, N.B.
	Official Analyst, Dr. M. Fiset, Quebec.									
Jan. 25	Borax, Kerry, Watson & Co.....	13762	18985	46·62	16·43	None.	None.	None. . .	Genuine..	J. A. Pelletier, druggist, Three Rivers, Que.
" 25	" McArthur, Corneille & Co., Montreal.	13765	18988	42·25	17·74	" .	" .	"	"	R. W. Williams, druggist, Three Rivers, Que.
" 29	" R. Heron & Co., Montreal....	13766	18989	43·73	17·52	" .	" .	"	"	A. A. Gingras, grocer, 55 Dominique, Que.
" 29	" W. Brunet & Co., Quebec.....	13769	18992	46·10	16·82	" .	" .	"	"	J. B. Morin, druggist, 325 St. Joseph, Que.
" 30	" Pure Gold Co., Toronto.....	13770	18993	46·40	16·28	" .	" .	"	"	E. Remillard, grocer, Quebec.
	Official Analyst, Dr. F. X. Valade, Ottawa.									
Jan. 9	Borax.....	14806	20546	47·09	15·96	.....	.... .	Faint trace of magnesia.	Good	Skinner & Co., druggist, Ottawa.
" 9	"	14807	20547	47·19	16·12	.....	.....	" ..	"	Graham & Elliott "
" 9	"	14808	20548	46·06	16·58	.....	.....	" ..	"	F. X. Conwell, grocer, Division St., Ottawa.
" 9	" Hamilton Coffee & Spice Co....	14809	20549	45·85	17·05	. ....	.....	" ..	"	Hand & Phillips, grocers, cor. Somerset and Division, Ottawa.

"	29	" Oriental Co., 33 Front St. E., Toronto.	14810	20560	43·29	17·21	.....	.....	" ..	"	Baldwin Bros., grocers, Nicholas St., Ottawa.
		Official Analyst, F. T. Harrison, London, Ont.									
Jan.	17	Borax, J. A. Kennedy, druggist, London, Ont.	14298	19434	47·32	15·03	None.	None.	.....	Slightly adulterated ; alumina, 1·40 ; sulphuric acid, 2·91.	Frank Hyde, druggist, Woodstock, Ont.
"	17	" A. Ramsay & Son, Montreal.	14299	19436	47·25	16·47	Trace.	Trace.	None.....	Unadulterated.....	John Holmes, hardware merchant-Woodstock, Ont.
"	17	" Gorman & Eckart, Spice Manufacturers, London, O.	14300	19438	46·15	16·17	None.	None.	"	"	Ryan & Russell, grocers, 670 Richmond St., London, Ont.
"	17	"	14311	19439	45·13	17·27	" .	" .	"	"	John Deprose, grocer, 50 Dundas St., London, Ont.
"	18	"	14302	19441	47·23	16·47	" .	" .	"	"	F. H. Laing, druggist, Windsor, Ont.
		Official Analyst, Dr. W. H. Ellis, Toronto.									
Jan.	22	Borax, Kerry, Watson & Co., Toronto	16058	20555	45·70	16·28	" .	" .	"	Genuine.....	F. H. Lutz, druggist, Gananoque.
"	22	" Dingman & Co., Toronto.....	16059	20556	42·40	17·66	" .	" .	"	"	Dept. Store Co., grocers, Gananoque
"	23	" Not known.....	16060	20557	38·80	18·58	" .	" .	"	"	Taylor & McKim " "
"	24	" "	16061	20558	41·30	17·81	" .	" .	"	"	D. L. Thompson, druggist, 394 Yonge St., Toronto.
"	24	" "	16062	20559	34·30	19·97	" .	" .	"	"	M. Short, grocer, Toronto.
Feb.	6	" Pure Gold Co., Toronto.....	16063	20566	46·00	16·58	" .	" .	"	"	J. Macolm, grocer, Spadina Avenue, Toronto.
"	6	" The Oriental Co., Front St., Toronto.	16064	20567	27·27	19·34	13·80	19·44	.....	Adulterated	W. J. Sykes, grocer, College St., Toronto.
		Official Analyst, Prof. E. B. Kenrick, Winnipeg.									
Jan.	22	Borax, The Bole Drug Co., Winnipeg.	17009	17302	44·81	16·92	None.	None.	"	Genuine.....	J. Vallen & Co., druggist, Winnipeg
"	22	" The Martin, Bole, Wynne Co., Winnipeg.	17010	17303	45·22	16·77	" .	" .	"	"	R. Dixon " "
"	25	" Nicholson & Brock, Toronto..	17015	17308	47·11	16·25	" .	" .	"	"	W. R. Johnson, grocer "
"	25	" Pugsley, Dingman & Co., Toronto.	17016	17309	46 27	16·55	. .	" .	"	"	T. E. Weldon & Co. "
		Official Analyst, Dr. C. J. Fagan, Victoria, B.C.									
Feb.	14	Borax, Henderson Bros., Victoria....	16968	21547	46·8	16·7	" .	.....	... . ..	"	M. J. Thompson, grocer, Victoria, B.C.
"	14	" Lyman, Son & Co., Montreal.	16969	21550	47·1	16·9	.....	....	... .. .	"	D. E. Campbell, druggist, Victoria, B.C
"	16	" Gorman, Eckart & Co., London, Ont.	16970	21555	47·2	16·7	.....	.....	.....	"	John Charters, grocer, Vancouver.
"	16	" The Gold Manufacturing Co., Montreal.	16971	21557	47·2	16·9	....	.....	.....	"	H. W. Carlson " "

APPENDIX J.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Specific Gravity at 15·5° C.	Total Solids in 100 CC.	Character of Solids.	Ash in 100 CC.	Reaction of Ash.	Total free Acidity in 100 CC. As Glacial Acetic Acid.	Total free Acidity in 100 CC. As Acetic Anhydride.
1901.	*Official Analyst, Dr. M. Fiset, Quebec.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Feb. 12	Pickles in vinegar, Montreal Canning Co.	13789	19774	1·03901	5·84	Dark.....	4·64	Alkaline..	1·58	1·34
" 13	Pickles in vinegar, Eureka Pickle Works, Montreal.	13790	19775	1·01995	2·71	"	2·22	" ..	1·61	1·36
" 14	Vinegar, Robitaille & Co., Montreal.	13791	19776	1·00835	0·16	Not charred.	0·03	" ..	5·07	4·31
" 15	Vinegar, M. Lefebvre & Co., Montreal.	13792	19777	1·01252	0·33	Dark.....	0·05	" ..	8·13	6·91
" 15	Vinegar, Theo. Lefebvre & Co., Montreal.	13793	19778	1·00619	0·13	Not charred.	0·02	" ..	3·81	3·24
" 22	Vinegar, Canada Vinegar Co., Montreal.	13794	19779	1·01196	0·67	" .	0·05	" ..	6·18	5·25
" 22	Pickles in vinegar, St. Eustache Canning Co.	13795	19780	1·03734	4·99	Dark....	3·79	" ..	4·16	3·53
" 27	Vinegar, Bollmans Imported..	13796	19781	1·01197	0·16	"	0·05	" ..	7·74	6·58
" 28	Pickles in vinegar, T. A. Lytle & Co., Toronto.	13797	19782	1·03431	5·00	"	3·44	" ..	2·17	1·85
" 28	Pickles in vinegar, Canada Pickling Co., Toronto.	13798	19783	1·02006	2·63	Nearly black.	1·90	" ..	2·50	2·12
	Official Analyst, Dr. F. X. Valade, Ottawa.									
March 6	Vinegar furnished by Bate & Co.	14832	20575	1·0058	0·29	Brown and dry.	0·05	Very alkaline.	4·38	3·72
" 6	Vinegar (proof), Lytle, Badgerow, Wilson & Co., Toronto.	14833	20576	1·0094	0·24	Palebrown and dry.	0·03	" ..	6·48	5·51
" 6	Vinegar (x white) Lytle, Badgerow, Wilson & Co., Toronto.	14834	20577	1·0053	0·24	Brown and dry.	0·02	" ..	4·08	3·47
" 6	Vinegar (English malt), Sir John Burnett, London, Eng.	14835	20578	1·0124	2·06	Brown soft and sticky	0·20	Sl. alka...	4·44	3·77
" 6	Vinegar (malt), Crosse & Blackwell, England.	14836	20579	1·0110	2·01	Brown and dry.	0·22	Very alkaline.	4·20	3·57
" 6	Pickles in vinegar, T. A. Lytle & Co., Toronto.	14837	20580	1·0303	4·73	" ..	3·17	Alkaline..	2·16	1·84
" 6	Pickles in vinegar, Canada Pickling Co., Toronto.	14838	20581	1·0179	2·41	Palebrown and dry.	1·26	Sl. alka...	2·22	1·89
" 6	Pickles in vinegar, Crosse & Blackwell, England.	14839	20582	1·0608	9·77	" ..	7·23	Alkaline..	3·12	2·65
" 6	Pickles in vinegar, Toronto Fruit Vinegar Co.	14840	20583	1·0327	5·17	Brown and dry.	2·64	Sl. alka...	2·28	1·94
	Official Analyst, Dr. W. H. Ellis, Toronto.									
Feb. 6	Vinegar, Wilson, Lytle & Badgerow, Toronto.	16065	20561	1·0092	0·35	Charred ..	0·02	Alkaline..	5·27	4·63
" 6	Vinegar, not known.	16066	20562	1·0067	0·18	" ..	0·02	" ..	4·44	3·90
" 6	Vinegar (malt) Maconachie, London, England.	16067	20563	1·0155	0·20	" ..	0·05	" ..	4·27	3·74
" 7	Vinegar.	16068	20264	1·0078	0·19	" ..	0·04	" ..	4·46	3·91
" 7	"	16069	20565	1·0069	0·19	" ..	0·04	" ..	5·02	4·40

SESSIONAL PAPER No. 14

VINEGAR—Tabulated Statement.

Analysis.				Remarks by Analyst.	Name and Address of Vendor o Sample.
Grammes, H_2SO_4 in 100 CC.	Alcohol in 100 CC. by weight.	Heavy Metals.	Empyreumatic Substances by Permanganate Test.		
p. c.	p. c.	p. c.			
0·194	.....	Iron and a little lead.	0·60	Low in acetic acid and contains lead.	H. Delisle, 214 St. Charles Baromme, Montreal.
.....	.....	" ..	0·25.....	" " ..	P. Brunneau, 70 St. Lawrence, Montreal.
.....	.....	" ..	0·15	A little below the B. P. standard in acetic acid.	E. Demers, 215 St. Charles, B. St. Montreal.
0·02	.....	.....	0·2	Genuine but contains lead.....	B. Leblanc & Co., Albert St., Hull, P.Q.
0·02	.....	Iron and a little lead.	0·1	Below B. P. standard in acetic acid ; adulterated.	Deschamp & Carrière, Bridge St., Hull, P.Q.
0·01	.....	Iron.....	0·1	Genuine.....	P. Rheault, St. Antoine St., Three Rivers, P.Q.
.....	.....	"	0·45.....	"	M. Lafontaine, St. Phillip St., Three Rivers, P.Q.
0·04	.....	Iron & trace of lead.	0·1	"	Arthur Rinfret, 414 St. Joseph, Quebec.
0·16	.....	" ..	6·0	Low in acetic acid and contains lead.	S. Martel, Champlain Market, Quebec.
.....	.....	Iron and some lead.	.....	" " ..	L. Faucher, Champlain Market, Quebec.
None. ...	0·74	None.....	0·24.....	Below standard in acetic acid ; adulterated according to Act.	Mrs. Wm. Slattery, Ottawa East.
"	1·67	Iron and alumina.	0·23 ...	Slightly under average in acetic acid ; fair sample.	G. T. Barrett, Ottawa East.
"	0·87	None.	0·22.....	Adulterated, being too low in acetic acid.	Hudson & Powell, Elgin St. Ottawa.
"	0·78	Iron and alumina.	0·6 ..	" " .	" "
"	0·87	" ..	0·55.....	Adulterated, too low in acetic acid.	J. Boyden, Sons & Co., Sussex St., Ottawa.
"	0·68	" ..	5 1	Much phosphate.....	Mrs. Wm. Slattery, Ottawa East.
"	0·47	" ..	1 45	"	G. T. Barrett, Ottawa East.
"	1·06	" ..	1·6	" and chlorides..	J. Boyden, Sons & Co., Sussex St., Ottawa.
Trace.....	0·42	" ..	2·3	"	Hudson & Powell, Elgin St., Ottawa.
Trace....	Trace.	Trace iron..	Less than 5 cc.	....	S. M. Short, grocer, Spadina Avenue, Toronto.
"	" .	" ..	" ..	. .. .	J. Malcolm, grocer, Spadina Avenue, Toronto.
0·12	" .	" ..	" ..	... .	W. J. Sykes, grocer, College St., Toronto.
....	" .	" ..	" ..	.....	John Giles, grocer, Peterboro.
.....	" .	" ..	" ..	.. . .	Geo. Carter Peterboro.

APPENDIX J.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Specific Gravity at 15·5° C.	Total Solids in 100 CC.	Character of Solids.	Ash in 100 CC.	Reaction of Ash.	Total free Acidity in 100 CC. As Glacial Acetic Acid.	Total free Acidity in 100 CC. As Acetic Anhydride.
1901.	*Official Analyst, Dr. W. H. Ellis, Toronto.*—Con.			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Feb. 6	Pickles in vinegar, Thos. Hoskins, Toronto.	16070	20570	1·0346	7·18	Charred..	1·73	Alkaline..	1·71	1·50
" 6	Pickles in vinegar, Crosse & Blackwell, London, Eng.	16071	20571	1·0625	11·38	" ..	7·25	" ..	3·56	3·13
" 7	Pickles in vinegar, Toronto Fruit & Vinegar Co.	16072	20572	1·0390	6·22	" ..	4·50	" ..	1·71	1·50
" 7	Pickles in vinegar, Heinz-Pittsburgh, N.S.	16073	20573	1·0239	3·39	" ..	2·03	" ..	3·01	2·64
" 7	Pickles in vinegar, Vendor...	16074	20574	1·0658	15·32	" .	0·86	" ..	3·09	2·71
	Official Analyst, F. T. Harrison, London, Ont.									
Feb. 5	Vinegar, Port Dover Vinegar Works	14303	19443	1·0130	0·405	No charring.	0·040	Alkaline .	7·84	6·66
" 5	Pickles in vinegar, Owen Sound Pickle Co.	14304	19444	1·0117	1·160	" ..	0·660	" ..	3·24	2·75
" 6	Pickles in vinegar, Williams & Son, Toronto.	14305	19445	1·0257	3·930	" ..	1·310	" ..	2·46	2·09
" 6	Vinegar, S. Allen, Norwich, Ont.	14306	19446	1·0116	1·445	" .	0·060	" ..	4·31	3·66
" 7	Vinegar, Wilson, Badgerow, Lytle & Co., Toronto.	14307	19447	1·0055	1·210	" ..	0·025	" ..	4·34	3·69
" 7	Pickles in vinegar, R. B. Johnson & Co., Swansea, Ont.	14308	19448	1·0220	2·900	" ..	1·080	" ..	3·53	3·00
" 8	Pickles in vinegar, Canada Pickling Co., Toronto.	14309	19449	1·0226	3·035	" ..	1·345	" ..	2·89	2·45
" 8	Vinegar (XX), P. E. Lumsden & Willard, Hamilton.	14310	19450	1·0069	0·188	" ..	0·035	" ..	4·15	3·53
" 8	Vinegar (crab apple), Wm. Lowell, Whitby.	14311	19451	1·0182	3·025	" ..	0·395	" ..	5·06	4·30
	Official Anyalst, Prof. E. B. Kenrick, Winnipeg.									
April 3	Vinegar (malt), The Blackwood Co., Winnipeg.	17030	17322	1·0256	5·43	Not charred.	0·47	Alkaline..	6·11	5·19
" 3	Vinegar (white wine), The Dyson Gibson Co.	17031	17323	1·0070	0·19	" ..	0·13	" ..	5·01	4·26
" 4	Vinegar, The Blackwood Co..	17032	17324	1·0091	0·90	" ..	0·23	" ..	4·21	3·58
" 4	Vinegar (cider), The Blackwood Co.	17033	17325	1·0174	3·34	" ..	0·43	" ..	5·25	4·46
8	Pickles in vinegar, The Blackwood Co.	17034	17326	1·0921	24·32	" ..	2·38	" ..	2·82	2·39
8	Vinegar (white star), The Dyson Gibson Co.	17035	17327	1·0186	3·08	" ..	2·18	" ..	2 04	1·73
8	Vinegar (bulk), The Dyson Gibson Co.	17036	17328	1·0186	2·62	" ..	1·38	" .	2·46	2·09
" 8	Vinegar, T. A. Lytle & Co., Toronto.	17037	17329	1·0213	3·37	" ..	1·79	" ..	2·48	2·11

SESSIONAL PAPER No. 14

VINEGAR—Tabulated Statement.

Analysis.				Remarks by Analyst.	Name and Address of Vendor of Sample.
Grammes, H_2SO_4 in 100 CC.	Alcohol in 100 CC. by weight.	Heavy Metals.	Empyreumatic Substances by Permanganate Test.		
p. c.	p. c.	p. c.			
0·02	"	"	More than 5·5		Wm. Morrison, grocer, 192 Queen W., Toronto.
0·12	"	"	"		Wm. Barber, grocer, 242 Queen W., Toronto.
0·14	"	"	Took 5 cc.		Geo. Carton, Peterboro'.
0·08	"	"	Not done.		Geo. H. Cooper, grocer, 250 Queen W., Toronto.
0·03	"	"	More than 5 cc.		Jas. Sutherland, Peterboro'.
Mere-est trace.	Trace.	Trace of iron	0·05	Unadulterated	C. McIlhaizey, grocer, Stratford.
Not sufficient liquid to determine.	Not sufficient for test.	"	0·1	Pickles made with pure vinegar.	Barrisdale Trading Co., grocer, Stratford.
"	Trace.	"	1·1	Pickles made with vinegar which contains added acetic acid.	Dodge Bros., grocers, Woodstock, Ont.
Mere-est trace.	0·39	None	0·05	Unadulterated	Ulman & Lazamby, grocers, Woodstock, Ont.
"	None.	Trace of iron	0·05	"	R. Kenny, Sarnia, Ont.
0.044	Trace.	"	2·1	Pickles made with vinegar which contains added acetic acid.	Edward Kelly, grocer, Sarnia, Ont.
0·133	"	None	1·2	" "	Brown Bros., grocers, 266 Dundas St., London, Ont.
Mere trace.	"	Trace of iron	0·05	Unadulterated	Geo. H. Davey, grocer, London, Ont.
"	1·60	"	0·8	Cider vinegar unadulterated	John Lawson, 261 Dundas St., London, Ont.
None	0·67		1·50	Doubtful	R. J. Gallagher & Co., Winnipeg.
"	None		1·8	Probably made from acetic acid.	F. Rosenblat, Winnipeg.
"	"		1·5	Doubtful	Philip Luhpzier.
"	0·86		1·4	"	J. R. Clements.
"	0·17		3·2	"	F. Hill.
"	0·10		1·1	"	C. Harrington & Co.
"	None.		0·7	"	Matheson Bros.
"	0·10		2·7	"	Hardy & Buchanan.

APPENDIX J.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result of						
				Specific Gravity at 15·5° C.	Total Solids in 100 CC.	Character of Solids.	Ash in 100 CC.	Reaction of Ash.	Total free Acidity in 100 CC. As Glacial Acetic Acid.	Total free Acidity in 100 CC. As Acetic Anhydride.
				p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
	Official Analyst, Dr. Fagan, Victoria, B.C.									
Feb. 26	Vinegar, John Stephens & Co., Gloucester, Eng.	16972	21560	1·007	0·2	Sl. charred	0·04	Neutral ..	4·75	4·04
" 26	Pickles in vinegar, W. Paterson, Son & Co., Brantford.	16973	21561	1·018	21·1	Not charred.	1·8	" ..	1·93	1·64
" 26	Pickles in vinegar, Coté Bros. Vinegar Co., Rochester and St. Louis, U.S.A.	16974	21562	1·011	0·52	Sl. charred	0·08	Sl. acid...	5·87	4·9
" 26	Pickles in vinegar, T. A. Lytle, Toronto.	16975	21563	1·029	6·98	" ..	1·42	Neutral ..	1·43	1·2
" 26	Pickles in vinegar, Coté Bros. Vinegar Co., U.S.A.	16976	21564	1·017	1·54	" ..	0·1	" ..	8·9	7·56
" 26	Pickles in vinegar, Rowat & Co., London, Eng.	16977	21565	1·022	3·9	" ..	0·66	Alkaline..	2·62	2·22
" 26	Pickles in vinegar, not known.	16978	21566	1·017	0·87	" ..	0·06	" ..	10·13	8·61
" 26	Pickles in vinegar, B. C. Fruit Canning Co., Vancouver.	16980	21567	1·018	2·26	" .	0·8	" ..	3·44	2·92

SESSIONAL PAPER No. 14

VINEGAR—Tabulated Statement—*Concluded.*

Analysts.				Remarks by Analyst.	Name and Address of Vendor of Sample.
Grammas. H_2SC_4 in 100 CC.	Alcohol in 100 CC. by weight.	Heavy Metals.	Empyrematic Substances by Permanganate Test.		
p. c.	p. c.	p. c.			
None.....	None.	None.	Took 3 cc. to colour 10 cc. of distillate	....	Welsh & Nightingale, Vancouver, B.C.
Trace.....	Not eno'gh of substance	"	No substance.	....	W. D. Muir, Vancouver, B.C.
None.....	None.	"	5 cc. to colour 10 cc. of distill'e	. ...	Wallace & Wallace, Vancouver, B.C.
"	Not eno'gh substance.	"	Not enog'h substance	.. ..	J. W. Cole, Vancouver, B.C.
"	0·53	"	7 cc. to colour 10 cc. of distill'e	.....	Mrs. Fleming, Vancouver, B.C.
Trace.....	0·1	"	Not enog'h substance	....	P. H. Alder, Vancouver, B.C.
"	0·25	"	7 cc. to colour 10 cc. of distill'e	....	W. B. Skinner, Vancouver, B.C.
Hea'y trace.	None.	"	6 cc. to colour 10 cc. of distill'e	....	W. Clarke, Vancouver, B.C.

APPENDIX K.—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result			
				Specific Gravity at 15·5° C.	Iodine Absorption.	Saponification Equivalent.	Maumene's Test.
1901.	*Official Analyst, Dr. M. Fiset, Quebec.*				p. c.		
June 3	Raw linseed oil, McCarkill, Dougall & Co., Montreal.	13811	19829	0·9322	158·06	289·3	107° c
" 3	Raw Linseed Oil, R. C. Jamieson & Co., Montreal.	13813	19831	0·9312	157·50	294·6	105°·5
" 6	Raw Linseed Oil	13814	19832	0·9341	157·10	296·0	110°·0
" 6	" John Shaw & Son, England	13816	19834	0·9346	157·6	299·7	110°·0
" 6	" Sherwin, Williams Co....	13818	19836	0·9318	159·81	300·6	112°·0
	Official Analyst, Dr. F. X. Valade, Ottawa.						
May 30	Raw Linseed Oil.....	14906	20853	0·9330	169·5	... .	172°·5c
" 30	"	14907	20854	0·9327	175.5	.....	135° c
June 5	"	14908	20855	0·9333	173·0	.....	130° c
" 5	"	14909	20856	0·9338	172·0	.... . .	130° c
	Official Analyst, Dr. W. H. Ellis, Toronto.						
May 6	Raw Linseed Oil, Livingston, Baden, Ont.	16101	20857	0·9335	174·7	.....	106° c
" 6	"	16102	20858	0·9329	171·2	.....	111° c
" 6	" Livingston, Baden, Ont..	16103	20859	0·9311	174·3	.. ....	109° c
" 5	"	16104	20861	0·9332	174·1	... .	112° c
	Official Analyst, F. T. Harrison, London, Ont.						
" 3	" J. J. Livingston, Baden, Ont	14345	19493	0·933	159·2	.....	.....
" 4	" Jas. Robertson, Paint and Oil Merchant.	14346	19494	0·934	158·7	.....	.....
" 5	" Robert Lewes.....	14349	19496	0·9335	157·6	... .	....
" 5	"	14350	19498	0·933	158·0	.....	.....
	Official Analyst, Prof. E. B. Kenrick, Winnipeg.						
June 4	Raw Linseed Oil, G. T. Stephens & Co., Winnipeg.	17050	17334	0·9340	172·2	.....	.....
" 4	" " " ..	17051	17335	0·9320	170·5	... .	.....

SESSIONAL PAPER No. 14

LINSEED OIL—Tabulated Statement.

OF ANALYSIS.							
Soluble in Oil of Turpentine.	Dries to Hard Varnish.	Congeals at.	Soluble in 90 per cent Alcohol.	Appearance.	Remarks by Analyst.	Name and Address of Vendor of Sample.
.....	.....	.....	.....	Dark yellow.	Genuine	J. Denis, 236 St. Lawrence, Montreal. (Hardware and Paint Merchant.)
.....	.....	.....	.....	Yellow ...	"	J. H. Wilson, 1874 Notre Dame, Mont'l. (Hardware.)
.....	.....	.....	.....	Brown	"	Lajeunesse & Frère, 773 Valier St., Quebec. (Hardware and Paint Merchant.)
.....	.....	.....	.....	" ..	"	C. A. Parent, St. Joseph St., Quebec. (Hardware.)
.....	.....	.....	.....	Dark yellow.	"	J. Sullivan, Main St. (Painter) Richmond.
Small proportions.	5 days..	20° 5c	.....	.....	Genuine	J. Skinner & Co., Ottawa.
" ..	4½ " ..	20° c	.....	.....	"	Joseph Archambault, (Oil and Colour Merchant), Ottawa.
" ..	5 " ..	22° c	.....	.....	"	W. Madill, Druggist, Peterboro.
" ..	5 " ..	20° c	.....	.....	"	Peterboro Hardware Co.
Complete.	.....	20° c	Incomplete.	.....	Genuine	Elliott & Co., Wholesale Druggists, Front St., Toronto.
" ..	.....	15° c	" ..	.....	"	Russell & Co., Hardware, King St., Toronto.
..	.....	20° c	" ..	.....	"	The Harris Co., Ltd., King St., Toronto.
..	.....	20° c	" ..	.....	"	Kingan Hardware Co., Peterboro.
.....	.....	.....	.....	.....	It fairly corresponds to the tests and characters outlined in the B.P.	McCurday Bros., Hardware, Stratford.
.....	.....	.....	.....	.....	It has considerable sediment, possibly drawn off from last of barrel, otherwise it fairly corresponds to the tests of B.P. Unadulterated.	Nevent, Clinton & Baxter, Hardware, Windsor, Ont.
....	....	.....	.....	.....	It fairly corresponds to the tests of B.P. Unadulterated.	Wm. Scarrow, Paint and Oil Merchant, London, Ont.
....	....	.....	.....	.....	" "	Jas. Cowan & Co., Hardware, London, Ont.
....	.....	.....	.....	.....	Genuine	Graham & Rolston, Hardware, Winnipeg.
.....	.....	.....	.....	.....	"	R. Wyatt, Hardware, Winnipeg.

APPENDIX K—INSPECTION OF

Date of Collection.	Description of Sample, together with Name and Address of Manufacturer when known.	No. of Analyst's Certificate.	No. of Sample.	Result			
				Specific Gravity at 15·5° C.	Iodine Absorption.	Saponification Equivalent.	Maumene's Test.
1901.	*Official Analyst, Prof. E. B. Kenrick, Winnipeg.*—Con.				p. c.		
May 4	Raw Linseed Oil, Body & Noakes, Winnipeg. Linseed Oil Mills.	17052	17336	0·9346	179·6	.....	.....
" 4	" Union Oil and Cake Mills. Rotherhithe, Eng.	17053	17337	0·9341	173·0	.....	.....
	Official Analyst, Dr. C. J. Fagan, Victoria, B C.						
Jun 4	Raw Linseed Oil.....	16985	21580	0·932	142·8	.....	.....
" 4	" Pilcher Co., London, Eng.	16986	21581	0·925	142·1	.....	.....
" 5	"	16987	21583	0·934	142·	.....	.....
" 5	" P. D. Dodds, Montreal...	16988	21584	0·935	143·	.....	.....

SESSIONAL PAPER No. 14

LINSEED OIL—Tabulated Statement—*Concluded.*

Results of Analysis.					Remarks by Analyst.	Name and Address of Vendor of Sample.
Soluble in Oil of Turpentine.	Dries to Hard Varnish.	Congeals at.	Soluble in 90 per cent Alcohol.	Appearance.		
.....	.....	.....	.....	.....	Genuine.	J. H. Ashdown, Hardware, Winnipeg.
.....	.....	.....	.....	.....	"	G. T. Stephens & Co., Oils and Paints, Winnipeg.
Soluble...	.....	.....	½ cc. in 10 cc.	Sl. turbid & yellow.	Spread on glass did not dry in 7 days. Dried in 12 hours at 100°c. Genuine.	Johnson & McPhail, Vancouver.
" ...	.....	.....	1 cc. in 10 cc.	" ..	Spread on glass dried in 7 days. Dried in 12 hours at 100°c. Genuine.	Vancouver Hardware Co.
" ...	.....	.....	½ cc. in 10 cc.	Yellow & clear.	" "	S. Shore, Victoria.
" ..	.....	.....	0·2 cc. in 10 cc.	Dk. yellow & clear.	" "	Nicholls & Renouf, Victoria.

APPENDIX L.

BULLETIN No. 74.—MILK, 1900.

OTTAWA, February 8, 1901.

E. MIALL, Esq.,
Commissioner of Inland Revenue.

SIR,—Appended to the present report will be found a tabulated statement, giving the results of examining 131 samples of milk which, in accordance with your instructions, were collected in various towns of the Dominion where, so far as could be ascertained by the food inspectors, no regular system of milk inspection had been instituted by the municipal authorities. The samples were obtained during November and December, last year, and the number collected in each town was as follows :—

Nova Scotia—	
Sydney, C.B.	3
Antigonish.	3
New Glasgow.	3
Windsor.	3
New Brunswick—	
Sussex.	3
Newcastle.	3
Bathurst	3
Campbellton	3
Quebec—	
Three Rivers.	5
Sherbrooke	6
Magog.	2
Lévis.	4
St. Hyacinthe.	7
Ontario—	
Ottawa	12
Brockville.	8
Cobourg.	6
Orillia.	8
Kingston.	6
Cornwall	4
Exeter.	3
Clinton.	3
Waterloo.	3
St. Marys	3
Glencoe.	1
Aylmer.	2
Simcoe.	4
Seaforth	2
Manitoba—	
Portage la Prairie.	3
Carberry	3
Regina.	3
Indian Head.	3
Brandon	3
Deloraine.	3
Total.	131

It will be observed from the table that in these analyses the percentage of ash has been determined, and that a new column has been added under 'analysis,' headed 'other solids.' This simply gives the non-fatty solids, less the ash. In view of their importance in forming an opinion regarding a sample, two special columns are added giving the percentage of 'total solids' and 'non-fatty solids.'

The opinions expressed by the district analysts regarding the milks will be found in the table. Of 131 samples, 104 or 79·4 per cent have been pronounced 'genuine' or 'unadulterated,' but some of these are abnormally rich in cream. When the amount of butter fat is almost as high as the 'non-fatty' solids, it is scarcely possible to regard the sample as genuine. Whether such richness is owing to carelessness in taking the sample or design on the part of the vendor must remain undecided. It is to be regretted that some of the analysts have not been sufficiently systematic in using the right expressions for their judgments, because this makes a comparison with former reports impossible. At p. 2 of Bulletin No. 43, an attempt was made to give a certain degree of definiteness to the expressions used by the analysts, and it would be well if this matter were to receive better consideration at their hands.

No addition of potassium-bichromate was made to any of the samples at the time of collection, and in consequence many of them were received in a state unfit for analysis. The addition was avoided in order to give the analysts an opportunity of searching for preservatives. It will be observed that no evidence was obtained of the use of anything of the sort. In this laboratory special care was taken to test for boracic acid, the method employed being essentially that described in Allen's Organic Analysis, Vol. IV., p. 176. Methyl alcohol was, however, substituted for ordinary alcohol, because, with the former, the greenish flame colour is more distinctly observed when boracic acid is present. Twenty to twenty-five grammes of milk were usually operated on, and in no case did the ash show any indication of the presence of boracic acid. After making the test, 1 cc of a 0·2 per cent solution of anhydrous borax, was frequently introduced into the capsule, when the presence of boracic acid was found to be distinctly recognisable. Even when this quantity is introduced into twenty grammes milk and evaporated and incinerated with it, the admixture can be detected. One cc of a 0·2 per cent solution of anhydrous borax in 20 grammes milk is equal to 0·0135 per cent of boracic acid. Since the usual addition for preserving purposes is said to be 35 grains of boracic acid per gallon of milk, or 0·05 per cent on the latter, it is evident that the above mentioned test is quite sufficient for its detection.

I beg to recommend the publication of the report, and

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

Results of the Examination of 131 Samples of Milk.

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Sp. Gr. at 15° C.	Acidity—Cc $\frac{N}{10}$ Soda required to neutralise 10 cc Milk.	Analysis.				Total Solids.	Non-fatty Solids.	Preservatives.	Remarks by Analysts.
					Ash.	Butter Fat.	Other Solids.	Water.				
1900.		*Sydney, C.B.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Nov. 27	20009	B. Fulton	1·0328	1·26	0·80	3·77	7·63	87·80	12·20	8·43		Genuine.
					0·77	3·84	7·71	87·68	12·32	8·48		
" 27	20010	E. P. Richardson	1·0226	0·92	0·55	2·93	5·51	91·01	8·99	6·06		Watered and therefore adulterated according to the Act.
					0·56	3·03	5·33	91·08	8·92	5·89	No boracic acid.	
" 27	20011	H. C. Archibald	1·0328	1·46	0·75	4·20	7·98	87·07	12·93	8·73		Genuine.
					0·80	4.12	7.75	88·05	11·95	7·90	No boracic acid.	
		Antigonish, N.S.										
" 29	20012	Jos. Jocelyn	1·0333	1·23	0·80	4·12	7·75	87·33	12·67	8·55		"
					0·75	4·12	7·85	87·28	12·72	8·60	No boracic acid.	
" 29	20013	F. R. Trotter	1·0338	1 44	0·77	5·70	8·56	84·97	15·08	9·38		"
					0·77	6·50	8·60	84·13	15·87	9·37	No boracic acid.	
" 29	20014	W. J. Landry	1·0350	1·85	0·71	3·73	8·43	87·13	12·87	9·14		"
					0·71	3·86	8·64	86·79	13 21	9·35	No boracic acid.	
		New Glasgow, N.S.										
" 30	20015	J. F. Morrow	1·0341	1·28	0·72	4.48	8·38	86·42	13·58	9·10		"
					0·73	4·54	8·43	86·30	13·70	9·16	No boracic acid.	
" 30	20016	N. W. Mason	1·0322	1·23	0·74	4·23	7·76	87·27	12·73	8·50		"
					0·71	4·17	7·99	87·13	12·87	8·70	No boracic acid.	
" 30	20017	Fraser Bros.	1·0334	1·28	0·74	4·18	8·04	87·04	12·96	8·78		"
					0·71	4·09	7·95	87·25	12·75	8·66	No boracic acid.	
		Windsor, N.S.										
Dec. 4	20018	T. H. Curry	1·0326	1·23	0·73	4·00	8·21	87·06	12·94	8·94		"
					0·67	4·00	8·18	87·15	12·85	8·85	No boracic acid.	
" 5	20019	Wm. Seary	1·0328	1·13	0·75	4·80	8·30	86·15	13·85	9·05		"
					0·71	4·88	8·22	86·19	13·81	8·93	No boracic acid.	
" 5	20020	W.C.T.U. Lunchroom	1·0330	1·33	0·77	4·20	8·00	87·03	12·97	8·77		"
					0·73	5·24	7·88	86·15	13·85	8·61	No boracic acid.	

			Sussex, N.B.										
Nov.	19	17744	Sussex Milk Co	1·0336	1·33	0·77	4·08	7·96	87·19	12·81	8·73		Genuine.
						0·66	3·82	8·72	86·80	13·20	9·38	No formaldehyde nor boracic acid.	
"	19	17745	"	1·0334	1·36	0·74	3·74	7·65	87·87	12·13	8·39		"
						0·60	3·52	8·84	87·04	12·96	9·44	No formaldehyde nor boracic acid.	
"	19	17746	"	1·0296	1·23	0·74	6·16	7·28	85·82	14·18	8·02		"
						0·59	6·08	7·82	85·51	14·49	8·41	No formaldehyde nor boracic acid.	
			Newcastle, N.B.										
"	21	17747	Mrs. F. James	1·0330	1·28	0·75	2·82	7·52	88·91	11·09	8·27		Adulterated; deficient in solids and butter fat.
					1·50	0·70	2·26	7·43	89·61	10·39	8·13	No formaldehyde nor boracic acid.	
"	21	17748	Wm. Jardine	1·0343	1·44	0·81	4·88	8·35	85·96	14·04	9·16		Genuine.
					1·60	0·67	5·16	8·52	85·65	14·35	9·19	No formaldehyde nor boracic acid.	
"	21	17749	John McKean	1·0303	1·18	0·82	8·03	7·56	83·59	16·41	8·38		Abnormal in fat.
					1·30	0·71	8·46	7·86	82·97	17·03	8·57	No formaldehyde nor boracic acid	
			Bathurst, N.B										
"	22	17750	Mrs. C. McGinly	1·0331	1·46	0·78	3·96	7·83	87·43	12·57	8·61		Genuine.
					1·60	0·66	4·02	8·04	87·28	12·72	8·70	No boracic acid.	
"	22	17751	P. P. Foley	1·0377	1·30	0·82	3·53	9·01	86·64	13·36	9·83		"
					2·30	0·67	3·68	9·22	86·43	13·57	9·89	No boracic acid.	
"	22	17752	John Kenny	1·0301	1·80	0·84	8·45	8·85	81·86	18·14	9·69		Abnormal.
					3·10	0·69	8·37	8·84	82·10	17·90	9·53	No boracic acid.	
			Campbellton, N.B.										
"	23	17753	Thomas Duncan	1·0343	3·75	0·82	4·32	8·09	86·77	13·23	8·91		Genuine.
				1·0342		0·67	4·16	8·40	86·77	13·23	9·07	No boracic acid.	
"	23	17754	David Doherty	1·0333	1·26	0·77	4·51	7·95	86·77	13·23	8·72		"
				1·0333		0·62	4·39	8·03	86·96	13·04	8·65	No boracic acid.	
"	23	17755	Jerome Peters	1·0300	1·30	0·73	3·50	7·00	88·77	11·23	7·73		Watered, and is therefore adulterated according to the Act.
						0·57	3·47	7·06	88·90	11·10	7·63	No boracic acid.	

The first line of figures in each of the foregoing samples shows the results reported by M. Bowman, Official Analyst, Halifax, N.S.
The second line shows the analysis as made in the Inland Revenue Laboratory, Ottawa.

RESULTS of the Examination of 131 Samples of Milk—*Continued.*

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Sp. Gr. at 15° C.	Acidity—Ce $\frac{N}{10}$ Soda required to neutralize 10 cc Milk.	Analysis.				Total Solids.	Non-fatty Solids.	Preservatives.	Remarks by Analyst.
					Ash.	Butter Fat.	Other Solids.	Water.				
1900.		*Three Rivers, Que.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
" 12	19702	W. Matté, Baulieu St	1·0332	1·3	0·73	3·75	8·07	87·45	12·55	8·80	None.....	Genuine.
			1·0333	1·3	0·62	3·60	8·20	87·58	12·42	8·82		
" 12	19703	P. Gouin, Baulieu St	1·0316	1·2	0·74	4·02	7·74	87·50	12·50	8·48	"	"
			1·0320	1·1	0·62	3·83	8·01	87·54	12·46	8·63		
" 12	19704	A. E. Leblanc, St. Roch St.	1·0347	1·8	0·82	4·67	8·61	85·90	14·10	9·43	"	"
			1·0342	1·6	0·71	4·63	8·88	85·78	14·22	9·59		
" 12	19705	Armond Beaudry, St. Marguerite St.	1·0329	1·6	0·76	3·96	7·89	87·39	12·61	8·65	"	"
			1·0326	1·5	0·66	3·78	8·12	87·44	12·56	8·78		
" 12	19706	Theo. Beaudry	1·0330	1·4	0·76	4·00	8·29	86·95	13·05	9·05	"	"
			1·0338	1·3	0·60	3·80	8·58	87·02	12·98	9·18		
		Sherbrooke, Que.										
" 15	19707	E. A. Little, Lennoxville St.	1·0292	1·2	0·70	3·35	6·98	88·97	11·03	7·68	"	Watered, being low in butter fat and other solids; adulterated.
			1·0272	1·4	0·56	3·22	7·02	89·20	10·80	7·58		
" 15	19708	W. S. Armitage, Ascot St.	1·0324	1·7	0·80	4·09	7·97	87·14	12·86	8·77	"	Genuine.
			1·0313	1·7	0·69	4·02	8·19	87·10	12·90	8·88		
" 15	19709	J. Lacombe, Orford St	1·0329	1·7	0·81	4·64	8·27	86·28	13·72	9·08	"	"
			1·0334	2·	0·70	4·55	8·43	86·32	13·68	9·13		
" 15	19710	P. Vaillancourt, Albertine St.	1·0324	1·5	0·77	3·94	8·19	87·10	12·90	8·96	"	"
			1·0327	1·5	0·73	3·91	8·10	87·26	12·74	8·83		
" 15	19711	David Lefebvre, Montreal Road.	1·0318	1·5	0·78	4·17	7·72	87·33	12·67	8·50	"	"
			1·0320	1·4	0·60	4·05	7·97	87·38	12·62	8·57		
" 15	19712	G. Fortier, Brook St.....	1·0323	1·5	0·79	3·86	7·80	87·55	12·45	8·59	"	"
			1·0326	1·4	0·73	3·69	7·88	87·70	12·30	8·61		
		Magog, Que.										
" 15	19713	E. J. Merry, farmer	1·0327	1·6	0·81	4·45	8·06	86·68	13·32	8·87	"	"
			1·0330	1·4	0·69	4·39	7·24	87·68	12·32	7·93		
" 15	19714	A. D. Rogers.....	1·0314	1·6	0·74	4·09	7·77	87·40	12·60	8·51	"	"
			1·0310	1·5	0·67	4·10	7·63	87·60	12·40	8·30		
		Lévis, Que.										
" 16	19715	Achille Currier	1·0316	1·5	0·75	4·33	7·84	87·08	12·92	8·59	"	"
			1·0322	.....	0·65	4·09	8·33	86·93	13·07	8·98		

"	16	19716	Arthur Hall, Village Saristeau.	1·0327	1·4	0·80	4·82	8·06	86·32	13·68	8·86	"	.....	
				1·0323	.....	0·66	4·55	8·41	86·38	13·62	9·07			
"	16	19717	Louis Begin, Village Saristeau.	1·0328	1·5	0·77	4·11	8·02	87·10	12·90	8·79	"	....	"
				1·0333	.....	0·58	3·82	8·40	87·20	12·80	8·98			
"	16	19718	Eug. Currier, Notre Dame de Lévis.	1·0329	1·6	0·74	4·18	8·20	86·88	13·12	8·94	"	....	"
				1·0334	.....	0·56	3·87	8·49	87·08	12·92	9·05			
			St. Hyacinthe, Que.											
Nov.	17	19719	Xavier Blain, Casade St...	1·0339	1·7	0·82	5·11	8·41	85·66	14·34	9·23	"	....	"
				1·0334	....	0·62	4·70	8·77	85·91	14·09	9·39			
"	17	19720	L. Marchesault, St. Joseph St.	1·0335	1·7	0·80	4·42	7·93	86·85	13·15	8·73	"	.....	"
				1·0335	... .	0·66	3·98	8·35	87·01	12·99	9·01			
"	17	19721	Ambrose Chenet, St. Pierre St.	1·0320	1·8	0·83	5·12	8·26	85·79	14·21	9·09	"	....	"
				1·0328	.....	0·64	4·70	8·65	86·01	13·99	9·29			
"	17	19722	J. B. Lemeux, St. Rosali.	1·0339	1·7	0·73	5·06	8·21	86·00	14·00	8·94	"	.....	"
				1·0327	.....	0·60	5·01	8·01	86·38	13·62	8·61			
"	17	19723	Louis Currier, St. Casemir.	1·0341	1·6	0·80	4·23	8·21	86·76	13·24	9·01	"	....	"
				1·0337	... .	0·65	4·07	8·33	86·95	13·05	8·98			
"	17	19724	E. Clapin, St. Dominique..	1·0321	1·6	0·77	4·70	7·71	86·82	13·18	8·48	"	... .	"
				1·0357	.. ..	0·71	4·48	7·35	87·46	12·54	8·06			
"	17	19725	B. Lalonde, St. Athanet...	1·0342	1·6	0·79	4·90	8·50	85·81	14·19	9·29	"	.....	"
				1·0327	.....	0·68	4·71	8·27	86 34	13·66	8·05			

The first line in each of the foregoing samples shows the results reported by Dr. M. Fiset, Official Analyst, Quebec.
The second line shows the analysis by Mr. A. L. Tourchot, Inland Revenue Laboratory, Ottawa, who also tested the whole of the samples for formaldehyde and boracic acid without finding any.

			Ottawa.											
Nov.	12	20518	J. J. Clarke.	1·0309	1·8	0·74	5·20	7·64	86·42	13·58	8·38	None.....	Genuine.	
				1·0335	1·5	0·43	4·83	8·77	85·97	14·03	9·20			
"	12	20519	W. Warnock.....	1·0274	1·6	0·66	5·32	7·16	86·86	13·14	7·82	"	Under average in solids not fat.	
				1·0335	1·	0·55	5·15	7·64	86·66	13·34	8·19			
"	12	20520	G. B. Dowler	1·0311	1·35	0·72	3·98	7·90	87·40	12·60	8·62	"	Genuine.	
				1·0325	1·4	0·59	3·86	8·18	87·37	12·63	8·77			
"	12	20521	E. Johnston.....	1·0289	1·55	0·65	3·70	7·58	88·07	11·93	8·23	"	"	
				1·0314	1·4	0·57	3·66	7·77	88·00	12·00	8·34			
"	12	20522	H. N. Mather.....	1·0308	1·83	0·71	4·77	8·03	86·49	13·51	8·74	"	"	
				1·0331	1·4	0·65	4·52	8·49	86·34	13·66	9·14			
"	12	20523	Bell Bros.....	1·0326	1·95	0·67	4·47	7·91	86·95	13·05	8·58	"	"	
				1·0329	1· 4	0·64	4·27	8·37	86·72	13·28	9·01			
"	13	20524	John Firth..	1·0293	1·84	0·66	4·80	7·54	87·00	13·00	8·20	"	Slightly under average in solids not fat, but rich in fat.	
				1·0324	1·5	0·62	4·20	8·20	86·98	13·02	8·82			
"	13	20525	G. Dowler.....	1·0315	1·63	0·68	3·84	8·08	87·40	12·60	8·76	"	Genuine.	
				1·0344	1· 8	0·65	3·59	8·46	87·30	12·70	9·11			
"	13	20526	C. Draffin	1·0292	1·45	0·73	4·31	7·68	87·28	12·72	8·41	"	"	
				1·0336	1·4	0·61	4·06	8·21	87·12	12·88	8·82			

RESULTS of the Examination of 131 Samples of Milk—*Continued.*

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Sp. Gr. at 15° C.	Acidity—Cc $\frac{N}{10}$ Soda required to neutralize 10 cc Milk.	Analysis.				Total Solids.	Non-fatty Solids.	Preservatives.	Remarks by Analysts.
					Ash.	Butter Fat.	Other Solids.	Water.				
1900		*Ottawa*—Con.			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Nov. 13	20527	E. Caldwell	1·0327	1·6	0·74	4·03	7·94	87·29	12·71	8·68	None	Genuine.
			1·0363	1·3	0·65	3·74	8·44	87·17	12·83	9·09		
" 13	20528	I. H. Heron	1·0305	1·75	0·75	4 61	8·19	86 45	13·55	8·94	"	"
			1·0325	1·5	0 67	4·08	8·24	87 01	12·99	8·91		
" 13	20529	J. M. Fulford	1·0269	1·30	0·63	3·67	7·06	88·64	11·36	7·69	"	Under average in solids not fat.
			1·0294	1·5	0·63	3·61	7·21	88·55	11·45	7·84		
		Brockville.										
" 16	20530	J. McCrea	1·0330	2·1	0·75	4·67	7·99	86·59	13 41	8·74	"	Genuine, rich in fat.
			1·0325	1·9	0·64	4·53	8·19	86·64	13·36	8·83		
" 16	20531	H. N. Crippin	1·0310	1·5	0·73	3·79	8·05	87·43	12·57	8·78	"	"
			1·0326	1·4	0·67	3·64	8·29	87 40	12·60	8·96		
" 16	20532	Josh. Morrison	1·0317	1·45	0·71	4·44	8·28	86·57	13·43	8·99		"
			1·0318	1·2	0·69	4·55	8·11	86·65	13·35	8·80		
" 16	20533	Row & Son	1·0323	1·55	0·77	5·51	8·40	85·32	14·68	9·17		" over average in fat.
			1·0328	1·5	0·75	5 52	8·70	85·03	14·97	9·45		
" 16	20534	J. W. Newman	1·0333	2·35	0·75	4 60	7·75	86·99	13·10	8·50		"
					0·57	4·72	8·56	86·15	13·85	9·13		
" 16	20535	F. Billings	1·0290	1·6	0·75	4·79	7·61	86·85	13·15	8·36		"
					0·58	4·28	8·25	86·89	13·11	8·83		
" 16	20536	M. Fitzpatrick	1 0306	1·8	0 77	4·38	7·82	87·03	12·97	8·59		"
					0·59	3·94	8·41	87 06	12·94	9·00		
" 16	20537	J. Berringer	1·0305	1·5	0·72	4·60	7·63	87·05	12·95	8·35		" rich in fat.
					0·60	4·11	8·11	87·18	12·82	8·71		

The first line in each of the foregoing samples shows the results reported by Dr. F. X. Valade, Official Analyst, Ottawa.
The second line shows the analysis by Mr. A. L. Tourchot, Inland Revenue Laboratory, Ottawa. Mr. Tourchot tested these samples also for formaldehyde, but was unable to obtain any evidence of its presence. Neither could he detect any boracic acid in them.

			Coboury, Ont.									
Nov.	28	19728	Jas. Bulger	1·0310	1·51	0·71	3·33	7·67	88·29	11·71	8·38	Below average in total solids.
						0·70	3·21	7·59	88·50	11·50	8·29	No boracic acid.
"	28	19729	C. J. Staples	1·0325	1·72	0·75	3·36	8·05	87·84	12·16	8·80	" in cream.
						0·75	3·26	8·01	87·98	12·02	8·76	No boracic acid.
"	28	19730	W. H. Finnemore	1·0335	1·41	0·60	3·58	8·36	87·46	12·54	8·96	Unadulterated.
						0·79	3·46	8·19	87·56	12·44	8·98	No boracic acid.
"	28	19731	J. H. Davidson	1·0330	1·51	0·67	4·16	8·15	87·02	12·98	8·82	"
						0·71	3·78	8·15	87·36	12·64	8·86	No boracic acid.
"	28	19732	Adam Jaynes	1·0335	1·61	0·71	3·46	8·25	87·58	12·42	8·96	"
						0·76	3·47	8·15	87·62	12·38	8·91	No boracic acid.
"	28	19733	Wm. Stoper	1·0330	1·72	0·61	3·38	8·21	87·80	12·20	8·82	Below average in cream.
						0·75	3·36	8·08	87·81	12·19	8·83	No boracic acid.
			Orilla, Ont.									
"	29	19734	B. R. Kane	1·0335	1·72	0·76	3·89	8·16	87·19	12·81	8·92	Unadulterated.
						0·72	3·87	8·12	87·29	12·71	8·84	No boracic acid, nor formaldehyde.
"	29	19735	Alfred Payne	1·0350	1·72	0·78	3·61	8·19	87·42	12·58	8·97	"
						0·72	3·61	8·16	87·51	12·49	8·88	No boracic acid, nor formaldehyde.
"	29	19736	T. Weyer	1·0330	1·51	0·73	3·65	8·09	87·53	12·47	8·82	"
						0·69	3·63	8·05	87·63	12·37	8·74	No boracic acid, nor formaldehyde.
"	29	19737	T. Hughes	1·0340	1·82	0·60	4·11	8·43	86·86	13·14	9·03	"
						0·72	4·13	8·19	86·96	13·04	8·91	No boracic acid, nor formaldehyde.
"	29	19738	Mrs. Donaldson, Coldwater St.	1·0310	1·02	0·69	3·32	7·43	88·56	11·44	8·12	Below average in total solids.
						0·66	3·38	7·26	88·70	11·30	7·92	No boracic acid, nor formaldehyde.
"	29	19739	R. Vanderburgh	1·0340	1·82	0·78	4·05	8·37	86·80	13·20	9·15	Unadulterated.
						0·70	4·02	8·28	87·00	13·00	8·98	No boracic acid, nor formaldehyde.
"	29	19740	Charles Breman	1·0330	4.34	0·67	3·61	8·10	87·62	12·38	8·77	" acidity was determined after standing two days.
						0·72	3·58	7·92	87·78	12·22	8·64	No boracic acid, nor formaldehyde.
"	29	19741	D. J. Dunn	1·0320	2·32	0·68	3·72	7·86	87·74	12·26	8·54	" "
						0·67	3·67	7·71	87·95	12·05	8·38	No boracic acid, nor formaldehyde.

RESULTS of the Examination of 131 Samples of Milk—*Continued.*

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Sp. Gr. at 15° C.	Acidity—Ce $\frac{N}{10}$ Soda required to neutralize 10 cc Milk.	Analysis. Ash.	Butter Fat.	Other Solids.	Water.	Total Solids.	Non-fatty Solids.	Preservatives.	Remarks by Analyst.
1900.		*Kingston, Ont.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Dec. 1	19742	P. E. Ward, Portsmouth	1·0340	1·42	0·75	3·34	7·75	88·16	11·84	8·50	.....	Below average in total solids.
					0·70	3·26	7·76	88·28	11·72	8·46	No boracic acid.	
" 1	19743	J. Abbott, Montreal Road	1·0340	1·77	0·80	5·42	8·58	85·20	14·80	9·38	.....	Unadulterated.
					0·72	5·48	8·50	85·30	14·70	9·22	No boracic acid.	
" 1	19744	Henry Rees, York Road	1·0340	1·56	0·73	3.54	7·70	88·03	11·97	8·43	.....	"
					0 66	3·56	7·79	87 99	12·01	8·45	No boracic acid.	
" 1	19745	Thos. O'Connor, Catarquai.	1·0340	1·92	0·73	3·79	8·00	87·48	12·52	8·73	.....	"
					0·69	3·79	8·10	87·42	12·58	8·79	No boracic acid.	
" 1	19746	H.Theriault, ConcessionSt.	1·0335	1·51	0·80	4·60	8·05	86·55	13·45	8·85	.....	"
					0·71	4·53	8·12	86·64	13·36	8·83	No boracic acid.	
" 1	19747	Monk Bros., Pittsburgh...	1·0335	1·56	0·81	3 95	8·14	87·10	12·90	8 95	.....	"
					0·71	4·07	8·18	87·04	12·96	8·89	No boracic acid.	
		Cornwall, Ont.										
" 4	19748	G. H. Broson, farmer.....	1·0315	1·51	0·70	4·32	7·98	87·00	13·00	8·68	.....	"
					0 68	4·20	7·77	87·35	12·65	8·45	No boracic acid.	
" 4	19749	Herman Kirk.....	1·0340	1·72	0·76	4·32	8·38	86·54	13·46	9·14	.....	"
					0·70	4·22	8·41	86·67	13·33	9·11	No boracic acid.	
" 4	19750	D. W. Clark, Front St....	1·0335	1·62	0·75	3·82	8·25	87·18	12·82	9·00	.....	"
					0·73	3·74	8·15	87·38	12·62	8 88	No boracic acid.	
" 4	19751	Jas. Howden, Centre Road.	1·0330	2·02	0·77	4·76	8·51	85·96	14·04	9·28	.....	"
					0·76	4·75	8·31	86·18	13·82	9·07	No boracic acid.	

Th first line in each of the foregoing samples shows the results reported by Dr. W. H. Ellis, Official Analyst, Toronto.
The second line shows the analyses by T. Macfarlane, Ottawa.

		Exeter, Ont.										
Nov. 16	19403	John McInnis.....	1·0320	6·9	0·66	5·74	6·36	87·24	12·76	7·02	None.	Under average in non-fatty solids.
					0·70	3·21	8·38	87·71	12·29	9·08		
" 16	19404	W. H. Dearring	Sample thick.	8·0	0 65	3·82	7·40	88·13	11·87	8·05	"	Genuine.
					0·67	4·34	6 99	88·00	12·00	7·66		

"	16	19405	A. Dow	"	8·0	0·63	3·67	8·48	87·22	12·78	9·11	None	Genuine.
						0·68	3·89	7·94	87 49	12·51	8·62		
			Clinton, Ont.										
"	17	19406	Adam Weir	1·0334	3·8	0·65	3·90	7·57	87·88	12·12	8·22	"	"
						0·62	3·23	7·96	88·19	11·81	8·58		
"	17	19407	Thos. J. Kemp	1·0311	4·1	0·64	6·40	7·23	85·73	14·27	7·87	"	Genuine ; very rich in butter fat.
						0·71	5·23	7·95	86·11	13·89	8·66		
"	17	19408	Benj. Churchill	1·0316	5·6	0·58	4·62	7·79	87·01	12 99	8·37	"	Genuine.
						0·66	4·41	7·65	87·28	12·72	8·31		
			Waterloo, Ont.										"
"	19	19409	E. E. Huehn	1·0297	2·0	0·60	6·23	6·44	86·73	13·27	7·04	"	Under average in non-fatty solids.
						0·58	4·43	7·83	87·16	12·84	8·41		Coagulated.
"	19	19410	Hy. Stroh	1·0314	4·3	0·56	5·87	7·14	86·43	13·57	7·70	"	Genuine ; rich in butter fat.
						0.61	2·44	9·23	87·72	12·28	9·84		Coagulated.
"	19	19411	Hy. Grein	Sample thick.	8·3	0·54	3·53	8·26	87·67	12·33	8·80	"	Genuine.
						0·68	3·64	7·80	87·88	12·12	8·48		Coagulated.
			St. Marys, Ont.										
"	20	19412	Wm. Pearin	1·0319	1·5	0·61	5·62	6·20	87·57	12·43	6·81	"	[watered. Very rich milk. Probably slightly
						0·69	3·59	8·23	87·49	12·51	8·92		Coagulated.
"	20	19413	Josh Meagher	1.0322	1·7	0·62	3·40	9·13	86·85	13·15	9·75	"	Genuine.
						0·64	3·42	7·39	88·55	11·45	8·03		Coagulated.
"	20	19414	Henderson & Billings	1·0313	1·5	0·58	6·36	6·10	86·96	13·04	6·68	"	Very rich milk. Probably slightly watered.
			Glencoe, Ont.										
"	21	19415	Peter Gardner	1·0305	3·0	0·56	5·16	7·20	87·08	12·92	7·76	"	Low in non-fatty solids.
						0·65	4·48	8·10	86·77	13·23	8·75		
			Aylmer, Ont.										
"	22	19416	H. Draper	1·0277	1·7	0·59	5·97	5·38	88·06	11·94	5·97	None	Very rich milk—probably slightly watered.
"	22	19417	V. J. McClennan	1·0290	1·6	0·62	6·16	6·61	86·61	13·39	7·23	"	Under average in non-fatty solids.
						0·64	4·98	7·72	86·66	13·34	8·36		
			Simcoe, Ont.										
"	23	19418	E. H. Widmer	1·0300	1·5	0·64	4·66	8·54	86·16	13·84	9·18	"	Genuine.
					6·3	0·69	4·70	7·12	87·49	12·51	7·81		Coagulated.
"	23	19419	J. H. Woolley	1·0299	1·5	0·54	3·42	8·10	87·94	12·06	8·64	"	Genuine.
					6·5	0·68	3·38	10·82	85·12	14·88	11·50		Coagulated.
"	23	19420	W. J. Kydd	1·0315	1·7	0·65	3 73	8·49	87·13	12·87	9·14	"	Genuine.
					8·5	0·71	3·38	7 41	88·50	11·50	8·12		Coagulated.
"	23	19421	E. C. Smith	1·0288	1·9	0·68	7·54	6·86	84·92	15·08	7·54	"	Partly cream.
					5·7	0·70	5·52	7·41	86·37	13·63	8·11		Coagulated.

RESULTS of the Examination of 131 Samples of Milk—*Concluded.*

Date of Collection.	No. of Sample.	Name and Address of Vendor.	Sp. Gr. at 15° C.	Acidity—cc $\frac{N}{10}$ Soda required to neutralize 10cc Milk.	Analysis. Ash.	Butter Fat.	Other Solids.	Water.	Total Solids.	Non-fatty Solids.	Preservatives.	Remarks by Analyst.
1900.		*Seaforth, Ont.*			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
Nov. 26	19422	Jas. B. Sproat	1·0329	7·1	0·58	4·44	8·36	86·62	13·38	8·94	None	Genuine.
					0·78	4·18	8·32	86·72	13·28	9·10		
" 26	19423	Jas. Dinnie.....	1·0317	1·6	0·68	3·86	8·03	87·43	12·57	8·71	"	"
					0·73	3·55	8·13	87·59	12·41	8·86		

The first line in each of the foregoing samples shows the results reported by F. T. Harrison, Official Analyst, London, Ont. The second line shows the results obtained in the Inland Revenue Laboratory, Ottawa, chiefly by Mr. A. L. Tourchot, who analysed samples 19403 to 19417, inclusive, and found them all free from boracic acid. He also tested Nos. 19403 to 19417 for formaldehyde, finding none. The analyses of Nos. 19422 and 19423 are by T. Macfarlane, who found them free from boric acid.

1900.		*Portage la Prairie, Man.*										
Nov. 20	17284	Andrew Kirk.....	.....	.....	0·75	9·87	8·44	80·94	19·06	9·19	....	Sample delayed by Dominion Express Co., and received in an unfit state for analysis.
				1·5	0·57	10·07	8·24	81·12	18·88	8·81	No formaldehyde nor boracic acid.	
" 20	17285	John Hannah.....	.....	... ...	0·74	5·23	7·48	86·55	13·45	8·22	....	" "
				1·5	0·52	4·63	8·33	86·52	13·48	8·85	No formaldehyde nor boracic acid.	
" 20	17286	Mrs. W. C. Kaake.....	....	.....	0·75	5·17	8·57	85·51	14·49	9·32	. ...	" "
				1·7	0·62	4·78	8·86	85·74	14·26	9·48	No formaldehyde nor boracic acid.	
		Carberry, Man.										
" 21	17287	W. Atkin	1·0333	1.88	0·75	4·51	8·54	86·20	13·80	9·29	....	Genuine.
			1·0324	.....	0·56	4·19	8·08	87·17	12·83	8·64	No boracic acid.	
" 21	17288	E. H. Cope...	1·0328	1·66	0·75	4·08	8·22	86·95	13·05	8·97	....	"
			1·0324	.. ..	0·68	3·87	7·70	87·75	12·25	8·38	No boracic acid.	
" 21	17289	Mrs. W. R. Clarke.....	1·0330	1·89	0·75	3·77	8·28	87·20	12·80	9·03	....	"
			1·0330	.....	0·64	3·06	7·87	88·43	11·57	8·51	No boracic acid.	
		Regina, Man.										
" 22	17290	Geo. Brodder.....	1·0320	1·67	0·74	3·54	7·96	87·76	12·24	8·70	....	"
			1·0333	.....	0·57	3·27	7·84	88 32	11·68	8·41	No boracic acid.	

"	22	17291	Thomas Watson	1·0334	1·61	0·77	4·82	8·51	85·90	14·10	9·28	"
				1·0334		0·64	4·57	8·47	86·32	13·68	9·11	No boracic acid.
"	22	17292	Mrs. A. Bannister	1·0336	1·64	0·73	3·05	8·31	87·91	12·09	9·04	Partly skimmed and therefore adulterated according to Act.
				1·034		0·63	3·15	8·36	87·86	12·14	8·99	No boracic acid.
			Indian Head, Man.									
"	23	17293	Wm. Fraser	1·0352	1·83	0·76	4·82	8·97	85·45	14·55	9·73	Genuine.
				1·035		0·65	4·58	9 12	85·65	14·35	9·77	No boracic acid.
"	23	17294	Mrs. S. B. Copithorn	1·0331	1·85	0·77	3 92	8·28	87·03	12·97	9·05	"
				1·034		0·60	3·45	8·69	87·26	12·74	9·29	No boracic acid.
"	23	17295	J. Harris Benbow	1·0359	1·84	0·80	4·31	9·03	85·86	14·14	9·83	"
				1·034		0·49	4·31	9·20	86·00	14·00	9·69	No boracic acid.
1900.			*Brandon, Man.*									
Nov.	24	17296	Andrew Mutter	1·0317	1·66	0·73	3·75	7·77	87·75	12·25	8·50	Below average, probably watered.
						0·73	3·72	7·75	87·80	12·20	8·48	No boracic acid.
"	24	17297	Alex. Neilly	1·0320	1·75	0·73	4·48	8·14	86·65	13·35	8·87	Genuine.
						0·79	4·36	7·98	86·87	13·13	8·77	No boracic acid.
"	24	17298	J. B. Noble	1·0326	1·82	0·70	4·62	8·35	86·33	13·67	9·05	"
						0·75	4·52	8·23	86·50	13·50	8·98	No boracic acid.
			Deloraine, Man.									
"	25	17299	Mrs. A. Cassels	1·0324	1·70	0·72	4·48	8·25	86·55	13·45	8·97	"
						0·74	4·03	8·43	86·80	13·20	9·17	No boracic acid.
"	25	17300	Mrs. James Shanks	1·0321	1·74	0·69	4 62	8·22	86·47	13·53	8·91	"
						0·74	4·00	8·19	87·07	12·93	8·93	No boracic acid.
"	25	17301	Mrs. N. E. Chapin	1·0314	1·63	0·75	5·81	8·20	85·24	14·76	8·95	"
						0·79	5·44	8·33	85·44	14·56	9·12	No boracic acid.

The first line in each of the foregoing samples shows the results reported by Prof. E. B. Kenrick, Official Analyst, Winnipeg.
The second line shows the results obtained in the Inland Revenue Laboratory, Ottawa.

APPENDIX M.

BULLETIN No. 75.—FERTILIZERS.

Ottawa, May 13, 1901.

E. Miall, Esq.,
Commissioner of Inland Revenue.

Sir,—I beg to submit herewith two tabulated statements: No. I., describing the standard samples of the fertilizers which, in accordance with the provisions of the Fertilizers Act, have been furnished to the Department by their manufacturers, importers or vendors, and No. II., containing the results of analysing the samples of fertilizers which have been collected as sold in the open market during the present year.

The number of samples described in Table I. is slightly below that for 1900, and much less than that of the two previous years.

In 1897	there were analysed	107	standard samples.
" 1898	"	124	"
" 1899	"	154	"
" 1900	"	107	"
" 1901	"	102	"

The decrease is mainly in the samples sent from the United States, where it is said that measures have been taken to confine their fertilizer trade in Canada to a smaller number of manufacturers. With reference to the standard samples, as given in Table I., it will be observed that as a rule two lines of figures are given opposite the description of each sample; the upper line gives the quantities of fertilizing constituents guaranteed by the manufacturers, and the lower line the results of the analysis in this Branch. The fourth column in the table states the materials from which the different fertilizers were manufactured in all cases where the information has been supplied. The column headed 'Relative value per ton of 2,000 pounds, gives the value of each fertilizer based upon the following prices for the fertilizing constituents:—

	Cents per pound.
Nitrogen in salts of ammonia or nitrates	13
Organic nitrogen in ground bone, fish, blood or tankage	12
Phosphoric acid, soluble in water	6
" soluble in 1 p.c. citric acid	5½
" insoluble in ground bone or tankage	5
" insoluble in Thomas' phosphate powder	3½
" insoluble in ground rock phosphate or in compound fertilizers	1½
Potash contained in wood ashes	6
" in high grade potash salts	5¼

It is to be observed with regard to the "fertilizers as sold" described in Table II., in which the date of the collection and the names of the vendors and manufacturers are given, that, in most cases, there are three lines of figures opposite the description of each sample. The uppermost of these shows the contents guaranteed by the manufacturer; the next lower line gives the percentage of fertilizing constituents found in the standard sample submitted to the department and the lowest line gives the same percentages found in the sample collected. In cases where no samples have been submitted, and nevertheless, in contravention of the Fertilizers Act, the fertilizers have been offered for sale, the two upper lines will of course show no figures.

According to the opinions expressed by the analysts, out of 65 samples collected none have been found to be adulterated and only 4 defective or not quite up to guarantee. Eleven samples were illegally sold, not having been registered

No objection has been taken to any of the samples of basic slag or Thomas phosphate powder, regarding which so much discussion took place last year. It will be observed that none of the samples of it mentioned in Table II. have been characterized as "adulterated under the Act." Since these samples were of the same nature as those of 1900, it will be necessary to explain the cause of this different finding and to relate the history of the question of "available" phosphoric acid from the point up to which it was given in last year's Bulletin (No. 70, p. 7.) By a reference to the latter it will be seen that the Agricultural Committee of the House of Commons adopted the amendment which the minister of Inland Revenue proposed to incorporate in the Bill brought in by Mr. James Domville, M.P., to amend the Fertilizers Act. Nevertheless, on account of the abandonment of Mr. Domville's Bill, no change in the Fertilizers Act was made, and the prospect was opened up of a continuation of the disagreement between the department and manufacturers or importers of basic slag.

Under these circumstances I proposed to you that the whole matter should be referred to the council and members of the Society of Public Analysts in London for such action as they might see fit to take, and I was authorized to open a correspondence with the secretaries of said Society with the view of obtaining a distinct expression of opinion regarding the analysis of basic slag and other fertilizers. Having, during the course of my leave of absence last year, had occasion to be in London, England, I took the opportunity of entering into communication, verbally and otherwise, with several members of the council of the Society of Public Analysts and with the secretaries. To the latter I addressed a letter dated 25th June, 1900, which was considered at a meeting of the council and a sub-committee was appointed to consider its subject. Dr. Dyer, however, wrote me that it was impossible to arrange for a meeting of this committee in July, and the matter had, therefore, to stand over until after the recess. It was not until the 16th of October that the sub-committee held a meeting, at which the proceedings, as communicated by the secretaries, were as follows :—

"EXTRACT OF MINUTES; SUB-COMMITTEE MEETING.

'Tuesday, Oct. 16, 1900.

'The President in the chair.

'Present: Dr. Dyer, Dr. Voelcker, Mr. Voelcker and Mr. Chapman.

'A letter was read from Mr. Smetham to Dr. Dyer in which he detailed his views on the subject of Mr. Macfarlane's proposal. After some discussion it was resolved that:—The committee, having very carefully considered the proposal of Mr. Macfarlane, as stated in his letter of June 25, and the documents referring to it, do not see their way to recommend the council to take steps in the direction either of laying down standards or of prescribing arbitrary methods for the analysis of fertilizers.

'With regard to the subject more especially dealt with in Mr. Macfarlane's report, (Bulletin No. 70) the Committee do not make any recommendation in reference to the formulation of an official process for the estimation of "available" phosphoric acid in basic slag or other fertilizers. The Committee are however unanimously of opinion that the ammonium citrate process, which is at present officially used in the United States of America, while affording a useful means for the approximative determination of "reverted" phosphates in superphosphates, dissolved bones and similar acid manures, is nevertheless in no sense an adequate means of measuring the amount of available phosphate that does not happen to have gone through the processes of solution and reversion.

'The Committee are further of opinion that the citrate of ammonium process is wholly inapplicable to the analysis of basic slag, and that if any process of analysis is to be used for distinguishing between *total* and *available* phosphate in that manure, it must be an acid process, and one proceeding on some such lines as the present process of Professor Wagner."

While in London I also took the opportunity of calling on the firm named H. & E. Alberts Chemical Works, from whom the supply of Thomas Phosphate Powder, which was imported into Canada had been obtained. I did this for the purpose of discussing fully with the manager of the firm the position of the question as set forth in Bulletin No. 70 pp. 5, 6 and 7, and in order to explain to them the reasons why their wish could not be complied with, that the Wagner method of determining the available phosphoric acid in basic slag should be adopted in this laboratory. In these discussions my arguments were mainly founded on the position taken under paragraph 5 on page 6 of Bulletin No. 70 which reads as follows :—'To apply a two per cent citric acid solution for determining the available phosphoric acid in Thomas Phosphate Powder, and not to the water-insoluble part of other fertilizers, would be a course calculated to occasion strong objections on the part of the fertilizermanufacturers of this country and of the United States.' Besides defending the position taken by this Branch, and also by the Agricultural Committee of the House of Commons, I also suggested a plan by which *all* fertilizers could be tested by exactly the same method without doing any injustice to the Thomas Phosphate Powder or basic slag. This consisted (after the removal of the soluble phosphoric acid, when present, by water) in boiling the water-insoluble residue, or, in the case of basic slag, the powdered sample direct with a strong solution of ammonium chloride, so as to remove any free lime which the sample might contain, and after this to determine the available phosphoric acid by a one per cent solution of citric acid as recommended by Dr. Bernard Dyer. The latter part of the plan is justified in an elaborate paper by that gentleman entitled 'On the analytical determination of probably available mineral plant food in soils,' and published in the Journal of the Chemical Society Vol. LXV., from which the following important conclusion may be quoted :—'A one per cent citric acid solution appears, then, to give indications fairly bearing out the manurial properties of phosphatic materials as recognizedby experience in the field ; it approximates fairly well to the average strength of the natural solvent (root-sap) used by the plant itself ; and tested by the result it gives on soils of known history and condition, it appears likely to afford a not unreliable means of gauging, as regards the available mineral constituents the probable fertility of the soil itself.' I endeavoured to explain the advantages of the method here indicated to the representatives of the Albert firm in London, but they suggested that I should visit their works at Biebrich on the Rhine and explain it to Mr. Heinrich Albert and also to Professor Dr. Wagner at Darmstadt. This I accordingly did, with the result that both gentlemen received me with much courtesy, exhibited much interest in my suggestions, and engaged to investigate their value.

In October, 1900, after my return to Canada, I caused some trials to be made in this laboratory by Mr. A. L. Tourchot on basic slag, using the processes above described. These experiments proved that about 8 per cent of lime were removed by the ammonium chloride solution and that this occasioned an increase of nearly 4 per cent in the citrate soluble or available phosphoric acid as determined by the ordinary official citrate of ammonia method. When, in treating the residue from 2 grammes of the sample, 200 c.c. of a 1 per cent citric acid solution is substituted, for the 100 c.c. of a 20 per cent solution of citrate of ammonia, and allowed to act in the cold for half an hour with moderate agitation, the increase in the available phosphoric acid is about the same.

These experiments were described in detail in a memorandum which I prepared for the meeting of the Association of official agricultural chemists which was held at Washington, on November 16, 1900. I attended this meeting, pressed the subject of my memorandum on the consideration of those present, and endeavoured to represent that it deserved investigation at the hands of the Association. I also submitted a draft of the changes I proposed, of which the following is a copy :—

Memorandum of proposed alterations in the analysis of fertilizers to be made in the official method under (3) 'Determination of Phosphoric Acid,' (4) and (5) on p. 13 of 'Methods of Analysis as adopted by the Association of Official Agricultural Chemists being Bulletin 46 U.S. Department of Agriculture.'

(4) Citric insoluble phosphoric acid.

(*a*) In acidulated samples—Introduce the filter containing the washed residue, deprived of water-soluble phosphoric acid, from two grammes of the original sample into a flask with 100 cc of 1 per cent citric acid solution, stopper tightly and shake violently until the filter paper is reduced to a pulp. Add 100 cc additional of the 1 per cent citric acid solution and digest at room temperature for half an hour, shaking the flasks thoroughly every five minutes. With four analyses in hand this means an agitation of one minute duration repeated six times. Filter and wash thoroughly. Dry and transfer the filter and its contents to a crucible, ignite until all organic matter is destroyed, add from 10 to 15 cc of strong nitric or hydrochloric acid and digest until all phosphate is dissolved. Dilute the solution to 200 cc, mix well, filter through a dry filter and proceed as under total phosphoric acid.

(*b*) In non-acidulated samples—In case a determination of citric insoluble phosphoric acid is required in non-acidulated samples, such as basic slag, Thomas phosphate powder, ground bone, bone char, bone ash, it is to be made by taking two grammes of the phosphatic material (without previous washing with water) and introducing it into a flask with 100 cc of a 5 per cent solution of ammonium chloride and boiling it for thirty minutes, replacing always the evaporated water, then filtering and washing the residue and treating it, exactly as above described with 1 per cent citric acid solution, determining the phosphoric acid in the residue.

(5) Citric Soluble Phosphoric Acid—The sum of the water-soluble and the citric-insoluble phosphoric acid subtracted from the total gives the citric-soluble phosphoric acid.

The sum of the latter and the water-soluble phosphoric acid is to be regarded as 'available phosphoric acid.'

After discussing my proposals, the Association voted that they should be submitted to the committee on recommendations for consideration and report. A similar decision was arrived at concerning a motion to permit Wagner's 2 per cent citric acid method to be used provisionally on basic slag until such time as the Association could arrive at a final conclusion. Subsequently, the committee reported in favour of submitting my proposals to the referee on fertilizers for further investigation, but declining to recommend the use of Wagner's process even temporarily. It will thus be seen that no decided action is to be expected on this subject by the Association until next November.

After my return from Washington, I requested Mr. McGill to undertake an investigation of the matter, which he did very thoroughly. His report is quite voluminous and is appended to this communication. On the whole it confirms the advisability of adopting the changes above referred to. The following extracts have special reference to these changes :—

'III. In basic slags a 5 per cent solution of ammonium chloride forms an effective solvent for the free lime, and does not dissolve phosphoric acid.'

'IV. Citric acid of 1 per cent strength is practically as efficient a solvent of phosphoric acid as a 2 per cent solution for lime-free slags.'

On January 4 last, I submitted to you a report regarding the condition of this question at that date. The Association of Official Agricultural Chemists had not had time to investigate the proposed changes, and the Society of Public Analysts in England had declined to make any positive recommendation. The English committee condemned the United States official method for determining 'available' phosphoric acid other than 'reverted,' and favoured one resembling Wagner's, while the United States Association declined to sanction the use of the latter, even temporarily. At the same time the necessity existed for coming to a conclusion regarding the methods to be used during the present year. I therefore applied to you to sanction the adoption in this laboratory of the methods proposed by me at once, and also for permission to request the district analysts to modify their treatment of fertilizer samples accordingly, beginning on February 1. This action received your approval, and has been in operation since the date mentioned.

It will be observed that, in both the tables of results of analysis now submitted, the old column heading under 'phosphoric acid' which used to read 'Reverted or citrate

soluble' has been changed to 'citric soluble,' which indicates the percentage of phosphoric acid soluble in a 1 per cent solution of citric acid. This percentage added to that of the water-soluble phosphoric acid is stated in another column as that of 'available' phosphoric acid. The general result of the alteration made in the analytical methods is slightly to increase the quantity of available phosphoric acid, not only in basic slag, but also in other fertilizers, and especially in those made from bone, and it would appear that in this way their practical agricultural effect is more closely indicated.

In conclusion I have to recommend the publication of this report with accompanying tables, as well as Mr. McGill's report, and also the memoranda on manures, which it has been customary to append to the fertilizer bulletins for some years past.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

TABLE I.

TABLE I.—Statement of the Results of Examining 102 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1148	Russia Cement Co., Gloucester, Mass.	S. C. Shaffner, Clementsport, N.S.		'Essex Complete Manure for Potatoes, Roots and Vegetables'— Guaranteed. Found.
1149	Imported	M. J. Henry, Vancouver, B.C.		'Muriate of Potash'— Guaranteed. Found
1150	Fraser River Oil & Guano Syndicate.	T. Watts, Manager Vancouver.		'Fish Guano'— Guaranteed. Found
1151	Palmerston Pork Pkg. Co., Ltd.	Manufacturers	Blood, bones and general packing house refuse.	'Tankage'— Guaranteed Found.
1152	The Standard Fertilizer and Chemical Co., Ltd., Smith's Falls Ont.	"	From mineral phosphate of lime.	'Superphosphate of Lime'— Guaranteed. Found
1153	" "	"	Made from nitrate of soda, sulphate of ammonia, potash and magnesia salts, mineral superphosphate, bone char and fine bone meal.	'Special Fertilizer'— Guaranteed. Found.
1154	" "	"		'No. 1 Fertilizer'— Guaranteed. Found.
1155	" "	"		'Standard Fertilizer'— Guaranteed. Found.
1156	" "	"		'Corn and Grass Fertilizer'— Guaranteed Found.
1157	" "	"		'Royal Fertilizer'— Guaranteed. Found
1158	" "	"	"	'Bone Meal'— Guaranteed Found
1159	" "	"		'Nitrate of Soda'— Guaranteed. Found
1160	Bowker Fertilizer Co., 43 Chatham St., Boston Mass.	"	Made from bone, bone black, phosphatic guano, bone phosphates, dried blood, meat or fish, sulphate of ammonia or nitrate of soda, sulphate of potash or muriate of potash and sulphuric acid.	'Bowkers' Potato and Vegetable Fertilizer'— Guaranteed. Found
1161	" "	"		'Bowkers' Square Brand Bone and Potash Fertilizer'— Guaranteed. Found
1162	" "	"		'Bowkers' Farm and Garden Fertilizer'— Guaranteed Found
1163	" "	"		'Bowkers' Vermont Fertilizer'— Guaranteed Found
1164	..	"		'Bowkers' Ground Bone'— Guaranteed Found

Samples of Commercial Fertilizers, registered for 1901.

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Samples.
Total, including that of Nitric Acid or Ammonia, if present.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
3·70	4·50	3·00	4·00	2·00	9·00	7·00	8·50	.....	26 40	1148
3·98	4·83	5·57	4·03	2·37	11·97	9·60	9·46	5·50	31 30	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1149
.....	.....	.....	.....	.....	.....	.....	50·40	5·58	52 92	
5·95	7·22	.....	.....	.....	9·08	.....	.....	22·57	.....	1150
5·76	6·99	0·64	4·93	3·52	9·09	5·57	0·43	20·30	23 98	
6·45	7·82	Trace.	3·83	7·87	11·70	3·83	0·17	.....	27 74	1151
5·92	7·19	0·77	6·14	5·57	12·48	6·91	0·20	5·68	27 67	
.....	.....	.....	.....	.....	16·00	14·00	.....	.....	.....	1152
.....	.....	12·66	1·74	2·55	16·95	14·40	.....	6·65	17 87	
.....	3·50	.....	.....	.....	10·00	8·00	6·00	.....	.....	1153
3·15	3·82	6·22	3·06	1·50	10·87	9·28	7·48	7·20	26 69	
.....	2·00	.....	.....	.....	11·00	9.00	1·00	.....	.....	1154
2·41	2·92	6·51	3·27	2·30	12·10	9·78	1·21	5·70	19 23	
.....	2·50	.....	.....	.....	11·00	9·00	2·00	.....	.....	1155
2·44	2·95	6·07	3·48	2·55	12·10	9·55	2·42	7·05	21 29	
.....	2·00	.....	.....	.....	9·00	7·00	4·00	.....	.....	1156
2·77	3·37	6·85	2·88	1·15	10·88	9 73	5·74	5·02	24 91	
.....	2·00	.....	.....	.....	9·00	8·00	3·00	.....	.....	1157
2·83	3·43	7·04	3·32	0·64	11·00	10·36	3·79	6·12	23 32	
.....	5·00	.....	.....	.....	.....	23·00	.....	.....	.....	1158
4·40	5·34	.....	15·35	7·36	22·71	15·35	.....	4·42	34 80	
.....	19·00	.....	.....	.....	.....	.....	.....	.....	.....	1159
16·22	19·67	.....	.....	.....	.....	.....	.....	0·46	38 92	
.....	2·00	.....	.....	.....	11·00	9·00	2·00	.....	.....	1160
2·00	2·43	4·40	5·00	2·30	11·70	9·40	2·14	6·15	19 04	
.....	2·00	.....	.....	.....	12·00	6·00	2·00	.....	.....	1161
2·13	2·52	2·05	6·97	3·38	12·40	9·02	2·66	3·45	18 52	
.....	2·00	.....	.....	.....	10·00	8·00	2·00	.....	.....	1162
2·21	2·68	4·28	4·84	2·58	11·70	9·12	2·95	5·50	19 62	
.....	3·00	.....	.....	.....	10·00	8·00	4·00	.....	.....	1163
2·64	3·21	8·00	1·53	0·92	10·45	9·53	4·26	7·00	22 73	
.....	3·00	.....	.....	.....	24·00	.....	.....	.....	.....	1164
2·62	2·75	.....	14·70	8·00	22·70	14·70	.....	3·85	31 86	

TABLE I.—Statement of the Results of Examining 102 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name of Brand of Fertilizer.
1165	The Laing Packing and Provision Co., Ltd., Montreal.	Manufactnrers.	Dried tankage and bones from hogs.	'Tankage'— Guaranteed. Found.
1166	Ingersoll Packing Co., Ingersoll Ont.	"	Blood, tankage and bone from the hog.	'Ingersoll Fertilizer'— Guaranteed Found
1167	The Wm. Davies Co., Ltd., Toronto.	"	Dried blood, bone and meaty matter.	Fertilizer 'Exhibit A'— Guaranteed Found
1168	The Nichols Chemical Co., Ltd., Capelton Que.	"	Canadian apatite, Tennessee apatite, sulphate of ammonia and muriate of potash.	'Capelton Brand'— Guaranteed. Found
1169	" "	"		'The Royal Canadian'— Guaranteed Found
1170	" "	"		'The Victor'— Guaranteed Found
1171	" "	"		'The Reliance'— Guaranteed. Found
1172	" "	"		'No. 1 Brand'— Guaranteed. Found
1173	" "	"		'Our Crown Brand'— Guaranteed Found
1174	Provincial Chemical Fertilizer Co., Ltd., St. John N.B.	"		'Imperial Superphosphate'— Guaranteed. Found
1175	" "	"		'Potato Phosphate'— Guaranteed. Found
1176	" "	"		'Victor Guano'— Guaranteed Found
1177	" "	"		'Bone Meal'— Guaranteed. Found
1178	The W. A. Freeman Co., Ltd., 57 Ferguson Ave., South Hamilton Ont.	"		'Freeman's Pure Bone Meal'— Guaranteed Found.
1179	" "	"		'Freeman's Sure Growth Manure'— Guaranteed. Found
1180	" "	"		'Freeman's Potato Manure'— Guaranteed. Found
1181	" "	" "		'Freeman's Bone and Potash'— Guaranteed. Found
1182	" "	" "		'Freeman's Celery and Early Vegetable'— Guaranteed Found.

Samples of Commercial Fertilizers, registered for 1901.

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
Total; including that of Nitric Acid or Ammonia, if present.	Total; Calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. p.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
4·12	5·00	....	.....	.....	14·71	.....	.....	5·52	.....	1165
4·59	5·58	.....	15·16	5·44	20·60	15·16	0·70	6·24	33 87	
....	9·00	....	5·50	6·80	.. ..	.....	.....	8·00	.....	1166
7·97	9·67	.....	10·40	0·80	11·20	10·40	0·64	8·10	32 04	
7·50	9·12	... .	.....	.....	13·60	.....	.....	7·43	.....	1167
8·13	9·87	0·50	9·22	2·48	12·20	9·72	.....	6·30	32 73	
.....	....	... .	.....	... ..	.....	8·00	.....	.....	.....	1168
....	..... .	8·20	0·90	5·10	14·20	9·10	.....	9·95	12 36	
.....	4·00	.....	.....	.....	.....	9·00	5·00	.....	.....	1169
4·06	4·94	9·30	0·62	3·08	13·00	9·92	5·23	4·90	27 99	
... .	2·00	....	.....	.....	.....	7·00	3·00	.....	.....	1170
2·36	2·87	6·30	1·25	4·55	12·10	7·55	3·92	9·40	20 08	
.....	2·00	....	.....	.....	.....	6·00	2·00	.....	... .	1171
2·35	2·85	5·53	1·55	4·82	11·95	7·13	2·72	5·05	18 34	
.. . .	..... .	.....	.....	.....	.....	11·50	.....	.....	..... .	1172
.....	.....	10·48	.....	4·70	15·18	10·48	.....	11·50	13 99	
.....	2·00	....	.....	.....	.....	11·00	2·50	.....	.. ..	1173
2·19	2·67	10·85	1·00	3·50	15·35	11·85	3·50	6·90	24 10	
2·29	2·79	6·43	1·56	8·28	16·27	7·99	2·27	.....	19 80	1174
2·52	3·06	7·50	3·26	6·64	17·40	10·76	2·35	9·10	23 10	
2·63	3·19	6·38	1·63	6·64	14·65	8·01	5·29	.....	23 30	1175
3·30	4·01	6·97	2·57	5·86	15·40	9·54	6·49	8·25	27 68	
1·55	1·89	6·15	1·25	6·64	14·04	7·40	2·24	.....	16 79	1176
2·18	2·65	7·15	3·14	5·36	15·65	10·29	2·43	8·50	21 42	
3 59	4·35	.....	.....	.....	24·48	.....	.....	.....	.....	1177
4·85	5·90	....	15·47	6·15	21·62	15·47	....	6·05	34 81	
....	3·00	....	.....	.....	23·00	.....	.....	.....	.....	1178
3·67	4·45	0·23	13·65	8·72	22·60	13·88	.....	7·30	32 82	
.....	3·50	....	.....	.....	8·00	.....	3·00	.....	..... .	1179
3·44	4·18	6·08	2·62	1·00	9·70	8·70	5·44	2·49	24 45	
.....	3·00	.....	.....	... .	8·00	.....	5·00	.....	.....	1180
3·30	4·01	5·95	2·46	1·39	9·80	8·41	7·40	2·00	26 51	
.....	2·00	....	.....	.....	9·00	.....	6·00	.....	....	1181
2·03	2·46	5·95	2·48	2·32	10·75	8·43	8·47	4·17	24 38	
.....	6·00	....	.....	.....	9·00	.....	6·00	.....	.....	1182
5·86	7.24	5·48	2·22	1·45	9·15	7·70	6·97	1·55	30 83	

TABLE I.—Statement of the Results of Examining 102 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name or Brand of Fertilizer.
1183	The W. A. Freeman Co., Ltd., 57 Ferguson Ave., South Hamilton, Ont.	Manufactures		'Freeman's Grass and Grain Manure'— Guaranteed ... Found
1184	" " ..	" " ..		'Freeman's Tankage Manure'— Guaranteed Found
1185	" " ..	" " ..		'Freeman's Tobacco Manure'— Guaranteed Found
1186	" " ..	" " ..		'Freeman's Phosphate Powder'— Guaranteed Found
1187	Canada Lime and Cement Co., Lake Weedon. Quebec.	" " ..		'Lake Weedon National Brand Fertilizer XX, for Vegetables and Gardens'— Guaranteed Found
1188	The American Agricultural Chemical Co., Bradley Fertilizer Works, Boston, Mass.	" " ..		'Bradley's XL Superphosphate of Lime'— Guaranteed Found
1189	" " ..	" " ..		'Bradley's Eclipse Phosphate'— Guaranteed Found
1190	" " ..	" " ..		'Bradley's Potato Fertilizer'— Guaranteed Found
1191	" " ..	" " ..		'Bradley's New Method Fertilizer'— Guaranteed Found
1192	" " ..	" " ..		'Bradley's Fine Ground Bone'— Guaranteed Found
1193	" " ..	" " ..		Williams & Clark's 'Corn Phosphate'— Guaranteed Found
1194	" " ..	" " ..		Williams & Clark's 'Potato Manure'— Guaranteed Found
1195	" " ..	" " ..		Williams & Clark's 'Royal Bone Phosphate'— Guaranteed Found
1196	" " ..	" " ..		'Soluble Pacific Guano'— Guaranteed Found
1197	" " ..	" " ..		'Pacific Potato Special'— Guaranteed Found
1198	" " ..	" " ..		'Pacific Nobsque Guano'— Guaranteed Found

Samples of Commercial Fertilizers, registered for 1901—*Continued.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
Total, including that of Nitric Acid or Ammonia, if present.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
.....	2·00	.....	.....	.....	9·00	.....	1·00	.....	.....	1183
2·98	3·62	4·55	2·28	4·52	11·35	6·83	3·30	2·55	19 93	
.....	5·00	.....	.....	.....	12·00	.....	.....	.....	.....	1184
7·36	8·94	.....	10·96	3·04	14·00	10·96	.....	4·70	32 76	
.....	6·00	.....	.....	.....	7·00	.....	7·00	.....	.....	1185
6·00	7·29	5·80	1·63	0·92	8·35	7·43	8·09	2·55	31 92	
.....	.....	.....	.....	.....	15·00	.....	.....	.....	.....	118
0·77	0·94	11·15	1·55	6·00	18·70	12·70	1·21	4·00	20 00	
.....	0·43	.....	.....	.....	10·11	.....	3·21	.....	.....	1187
1·21	1·56	.....	6·40	4·40	10·80	6·40	2·80	0·50	14 20	
2·06	2·50	5·00	3·09	2·00	10·00	8·00	1·50	.....	16 41	1188
2·67	3·25	6·40	4·09	1·60	12·09	10·49	3·52	12·08	22 77	
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	1189
1·41	1·72	6·21	3·26	2·05	11·52	9·47	2·47	15·32	17 62	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	1190
2·23	2·70	6·72	2·87	2·05	11·64	9·59	3·96	12·76	20 92	
1·03	1·25	6 00	2·00	2·00	10·00	8·00	2·00	.....	14 57	1191
1·34	1·63	5·89	4·02	1·73	11·64	9·91	3·03	15·14	18 21	
.....	3 00	.....	.....	.....	22·80	.....	.....	.....	.....	1192
3·72	4·52	.....	16·63	7·68	24·31	16·63	.....	5·70	34 90	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	16 41	1193
2·48	3·01	6·46	4·74	1·28	12·48	11·20	2·16	11·70	21 56	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	1194
2·24	2·72	6·75	2·66	2·14	11·55	9·41	4·09	13·40	21 35	
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	1195
1 26	1·53	6·50	3·14	1·66	11·30	9·64	2·66	15 40	17 57	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	16 41	1196
2·38	2·89	6·80	3·19	1·86	11·85	9·99	2·20	13·55	20 25	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	1197
2·17	2·63	6·50	3·12	1·88	11·50	9·62	3·46	13·00	20 63	
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	1198
1·60	1·94	6·05	3·63	1·42	11·10	9·68	2·12	14·70	17 73	

TABLE I.—Statement of the Results of Examining 102 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	Name of Brand of Fertilizer.
1199	The American Agricultural Chemical Co., Bradley Fertilizer Works, Boston, Mass.	Manufacturers		'Pacific Fine Ground Bone'— Guaranteed Found
1200	" "	" "		'Cleveland Fertilizer for all Crops'— Guaranteed Found
1201	" "	" "		'Quinnipiac Climax Phosphate'— Guaranteed Found
1202	" "	" "		'Quinnipiac Mohawk Fertilizer'— Guaranteed Found
1203	" "	" "		'Quinnipiac Potato Phosphate'— Guaranteed Found
1204	" "	" "		'Cumberland Superphosphate'— Guaranteed Found
1205	" "	" "		'Cumberland Potato Fertilizer'— Guaranteed Found
1206	" "	" "		'Cumberland Fine Ground Bone'— Guaranteed Found
1207	" "	" "		'Read's Standard'— Guaranteed Found
1208	" "	" "		'Read's Leader'— Guaranteed Found
1209	" "	" "		'Tucker's Imperial bone superphosphate'— Guaranteed Found
1210	Palmerston Pork Pkg. Co., Limited, Palmerston, Ont.	" "	Blood, bone and general packing house refuse.	'Tankage'— Guaranteed Found
1211	The American Agricultural Chem'l Co., Rutland, Vermont.	" "		'Great Eastern General Fertilizer'— Guaranteed Found
1212	" "	" "		'Great Eastern Potato manure Fertilizer'— Guaranteed Found
1213	" "	" "		'Great Eastern Northern Corn Special Fertilizer'— Guaranteed Found
1214	" "	" "		'Great Eastern Grass and Oats Fertilizer'— Guaranteed Found
1215	The Leeds Phosphate Work, Hunslet, Leeds, England.	" "		'Basic Slag'— Guaranteed Found

SESSIONAL PAPER No. 14

Samples of Commercial Fertilizers, registered for 1901.—*Continued.*

Results of analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia, if present.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
.....	3·00	.....	.....	.....	22·80	.....	.....	.....	.....	1199
2·88	3·51	Trace	18·98	3·42	22·40	18·98	.....	·50	31 21	
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	1200
1·27	1·55	5·85	3·67	1·48	11 00	9·52	1·99	15·35	16 84	
1·03	1·25	6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	1201
1·34	1·63	5·81	4·24	1·25	11·30	10·05	2·49	11·40	17 83	
0·82	1·00	5·00	2·00	1·00	8·00	7·00	1·00	.....	11 52	1202
1·18	1·43	2·90	5·82	2·88	11·60	8·72	1·76	9·65	16 58	
2 06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	1203
2·13	2·58	6·60	3·22	1·88	11·70	8·48	3·75	15·60	20 97	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	1·50	.....	16 41	1204
2·42	2·94	6·90	3·49	1·76	12·15	8·66	2·47	11·75	21 14	
2·06	2·50	5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	1205
2·16	2·62	6·90	2·69	1·76	11·35	8·66	3·61	13·35	20 83	
.....	3·00	.....	.....	.....	22·80	.....	.....	.....	.....	1206
4·61	5·59	.....	12·92	9·68	22·60	12·92	.....	5·00	35 44	
0·82	1·00	5·00	3·00	2·00	10·00	8·00	4·00	.....	13 97	1207
1·43	1·73	6·60	2·85	1·90	11 35	9·45	4·88	23·84	20 17	
0·82	1·00	5·00	2·00	1·00	8·00	7 00	1·00	.....	11 52	1208
1·22	1·48	3·10	5·25	2·95	11·30	8·35	3·07	11·02	15 53	
1·03	1·25	6·00	2·00	2 00	10·00	8·00	2·00	.....	14 57	1209
1·39	1·68	6·45	3·25	1·70	11·40	9·70	2·64	14·72	17 93	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1210
8·54	10·37	.....	5 65	1·60	7·25	5·65	2·47	8·54	30 92	
.....	1·00	8·00	.....	1·00	.....	.....	4.00	.....	.....	1211
1·38	1·68	6·05	3·53	2·12	11·70	9·58	4·15	11·10	19 45	
.....	2·50	8·00	.....	1·00	.....	.....	3 00	.....	.....	1212
2 15	2·62	6·60	2·81	2·14	11·55	9·41	2·74	12·40	19 69	
.....	2·50	8·00	.....	1·00	.....	.....	2·00	.....	.....	1213
2·21	2·68	6·65	3·47	1·98	12·10	10·12	1·95	11·40	19 74	
.....	.....	11·00	.....	1·00	.....	.....	2·00	.....	.....	1214
Traces....	.....	6·70	4·85	3·70	15·25	11·55	2·18	9·45	16 77	
.....	.....	.....	.....	.....	18·00	.....	.....	.....	.....	1215
.....	.....	.....	9·80	9·71	19·51	9·80	.....	0·02	17 42	

TABLE I.—Statement of the Results of Examining 102 Standard

Number of Sample.	Name of Manufacturer.	By whom sent.	From what Material Produced.	Name or Brand of Fertilizer.
1216	The Leeds Phosphate Works, Hunslet, Leeds, England.	Manufacturers.....	.....	'Basic Slag'— Guaranteed. ..... Found. .....
1217	The Thomas Phosphate Company.	Wm. Gray, Ottawa.	.....	'Thomas' Phosphate Powder'— Guaranteed. ..... Found.....
1218	W. Harris & Co., Toronto.	Manufacturers..	.....	'Bone Meal'— Guaranteed. ..... Found.....
1219	" " ..	" " ..	Blood, flesh & bone..	'Brand H'— Guaranteed..... Fonnd .....
1220	Thos. Reid, St. John N.B.	" " ..	.....	'Superphosphate'— Guaranteed..... Found.....
1221	Wm. Faint, Peterboro'.	" " ..	.....	'Bone Meal'— Guaranteed..... Found.....
1222	The Nova Scotia Fertilizer Co., Halifax N.S.	" " ..	Tankage, char, potash & kainite.	'Ceres Superphosphate'— Guaranteed..... Found. .....
1223	" " ..	" " ..	Tankage, nitrate of soda, char, muriate of potash aud kainite.	'Apple Tree Phosphate'— Guaranteed ..... Found .....
1224	" " ..	" " ..		'Strawberry Phosphate'— Guaranteed. ..... Found.... .....
1225	" " ..	" " ..	"	'Potato Phosphate'— Guaranteed. ..... Found.....
1226	" " ..	" " ..	....	'Ground Bone'— Guaranteed ..... Found. .....
1227	Victoria Chemical Co., Limited, Victoria, C.B.	" " ..	....	'"A" Kainite'— Guaranteed..... Found.....
1228	" " ..	" " ..	.....	'"B" Muriate of Potash'— Guaranteed. . ... Found... .. ..
1229	" " ..	" " ..	....	'"C" Sulphate of Potash'— Guaranteed . . .. Found..... .....
1230	" " ..	" " ..	....	'"D" Superphosphate'— Guaranteed..... Found ....
1231	" " ..	" " ..	.....	'"E" Nitrate of Soda'— Guaranteed .... Found ....
1232	" " ..	" " ..	....	'"F" Mixed Fertilizer'— Guaranteed..... ..... Found.. .....
1233	Russia Cement Co., Gloucester, Mass.	S. C. Shaffner, Clementsport, N.S.		'Essex Complete Manure, for corn-grain and grass'— Guaranteed. . ..... Found..... ... .

Samples of Commercial Fertilizers, registered for 1901—*Continued.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative Value per Ton of 2,000 lbs.	Number of Sample.
Total including that of Nitric Acid or Ammonia, if present.	Total Calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
					20·00					1216
			14·40	6·15	20·55	14·40			20 14	
					18·00					1217
			14·49	3·10	17·59	14·49			18 11	
										1218
4·54	5·51		11·34	6·96	18·30	11·34		1·80	30 33	
										1219
7·56	9·18		7·50	2·80	10·30	7·50		8·45	27 23	
										1220
4·83	5·86	1·80	4·50	3·60	9·90	6·30	1·87	15·60	21 74	
										1221
3·84	4·65		13·94	6·76	20·70	13·94		4·85	31 31	
	2·00						2·14			1122
1·97	2·40	2·69	4·98	6·08	13·75	7·67	4·56	6·16	20 05	
	3·25						6·53			1223
2·81	3·42	2·24	3·83	5·25	11·32	6·07	9·07	12·36	24 77	
	2·02						6·50			1224
2·46	2·99	2·37	2·42	5·57	10·36	4·79	10·62	5·92	24 22	
	3·71						4·70			1225
2·65	3·21	2 69	4·02	6·53	13·24	6·71	5·29	6·26	24 13	
										1226
2·94	3·57		17·14	8·13	25·27	17·14		8·60	34 04	
							12·00		12 60	1227
							11·49		11 86	
							50·00		52 50	1228
							50·59	2·85	53 12	
							50·00		52 50	1229
							49·13	1·90	51 59	
		16·00								1230
		15·70	0·92	0·68	17·30	16·62	0·66	13·50	21 22	
16·00	19·00								41 60	1231
15·48	18·77							0·55	40 25	
2·00					5·00		3.50			1232
2·33	2·70	4·16	0·96	0·64	5·76	5·12	3·55	8·63	15 56	
3·70	4·50	3·00	4·00	2·50	9·50		9·50		27 61	1233
3·75	4·56	3·33	5·62	1 60	10·55	8·95	9·12	8·92	29 24	

TABLE I.—Statement of the Results of Examining 102 Standard

Numéro de l'échantillon.	Name of Manufacturer.	By whom sent	From what materials produced.	Name or Brand of Fertilizer.
1234	Russia Cement Co., Gloucester, Mass.	S. C. Shaffner, Clementsport, N.S.	.....	'Market Garden and Potato Manure'— Guaranteed..... Found.....
1235	" " ..	"	.....	'Essex XXX Fish and Potash'— Guaranteed..... Found.....
1236	H. B. Marcille, Thorold, Ont.	Manufacturers.....	Blood, meat and bone, with clay loam as a drier.	'Fertilizer'— Guaranteed..... Found.....
1237	New England Fertilizer Co., 43 North Market st., Boston Mass.	"	Nitrogen derived from organic matter. Phosphoric acid derived frrm high grade phosphates, and potashfrom high grade muriate and sulphate of potash.	'New England Potato Fertilizer'— Guaranteed..... Found.....
1238	" " ..	"		'New England Corn Phosphate'— Guaranteed..... Found.....
1239	F. D. Burris, Truro N.S.	"	.....	'General Phosphate'— Guaranteed..... Found.....
1240	" " ..	"	.....	'Bone Meal'— Guaranteed..... Found.....
1241	" " ..	"	.....	'Potato Phosphate'— Guaranteed..... Found.....
1242	Lowell Fertilizer Co., 44 North Market st., Boston, Mass.	"	Animal matter, high grade superphosphate, muriate of potash, and high grade sulphate of potash.	'Swift's Lowell Bone Fertilizer'— Guaranteed..... Found.....
1243	" " ..	"		'Swift's Lowell Animal Fertilizer'— Guaranteed..... Found.....
1244	" " ..	"		'Swift's Lowell Potato Phosphate'— Guaranteed..... Found.....
1245	" " ..	"		'Swift's Lowell Potato Manure'— Guaranteed..... Found.....
1246	" " ..	"	.....	'Swift's Lowell Ground Bone'— Guaranteed..... Found.....
1247	B. and M. Rattenbury, Charlottetown, P.E.I.	"	.....	'Tankage, Blood, Potash and Nitrate of Soda Fertilizer'— Guaranteed..... Found.....
1248	" " ..	"	.....	'Dried Blood Fertilizer'— Guaranteed..... Found.....
1249	.....	Messrs. Wallace & Fraser, St. John N.B.	.....	'Albert's Thomas' Phosphate Powder Basic Slag'..... Guaranteed..... Found.....

Samples of Commercial Fertilizers, Registered for 1901.—*Concluded.*

Results of Analysis.										
Nitrogen.		Phosphoric Acid.					Potash.	Moist. ure.	Relative Value per ton of 2,000 lbs.	Number of Sample.
Total, including that of Nitric Acid or Ammonia, if present	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Avail-able.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.	
2·00	2·40	4·50	4·50	2·00	11·00	.....	5·00	.....	21 00	1234
2·51	3·04	5·44	3·97	2·24	11·65	9·41	4·79	11·62	22 62	
2·10	2·50	4·50	4·50	3·00	12·00	.....	2·25	.....	19 66	1235
2·42	2·84	6·72	3·51	2·56	12·79	10·23	2·74	7·17	21 38	
.....	5·78	.....	3·20	5·11	8·31	.....	3·95	3·65	.....	1236
3·30	4·01	0·60	3·43	4·16	8·19	4·03	3·76	5·02	20 52	
1·64	2·00	.....	.....	.....	.....	7·00	4·00	.....	.....	1237
2·39	2·90	3·20	3·64	1·92	8·76	6·84	4·65	4·30	19 14	
1·64	2·00	.....	.....	.....	.....	8·00	3·00	.....	.....	1238
2·08	2·53	3·84	4·92	1·92	10·68	8·76	3·38	7·35	19 14	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1239
1·68	2·04	.....	3·20	0·64	3·84	3·20	3·20	17·17	11 14	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1240
2·74	3·33	.....	5·11	11·52	16·63	5·11	0·02	0·32	23 74	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1241
1·57	1·90	0·64	3·81	0·67	5·12	4·45	6·08	18·15	15 31	
.....	2·00	.....	.....	.....	.....	8·00	3·00	.....	.....	1242
1·66	2·02	4·48	4·49	0·63	9·60	8·97	3·29	7·44	17 51	
.....	3·00	.....	.....	.....	.....	9 00	4·00	.....	.....	1243
2·35	2 86	5·43	3·85	2·07	11·35	9·28	4·90	8·84	20 70	
.....	3·00	.....	.....	.....	.....	8·00	6·00	.....	.....	1244
2·35	2·86	2·56	5·59	1·12	9·27	8·15	8·00	4·96	22 82	
.....	2·00	.....	.....	.....	.....	7·00	4·00	.....	.....	1245
1·57	1·90	3·84	3·20	1·11	8·15	7 04	4·34	4 52	16 01	
.....	3·00	.....	.....	.....	25·00	.....	.....	.....	.....	1246
2·46	2·99	0·47	12·48	14·55	27·50	12·95	.....	3·60	34 74	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1247
6·60	8·02	0·40	6·75	3·60	10·75	7·15	4·38	7·80	29 42	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1248
9·47	10·90	.....	5·61	1·04	6·65	5·61	.....	17·25	29 94	
.....	.....	.....	.....	.....	15·00	.....	.....	.....	.....	1249
.....	.....	.....	11·83	3·20	15·03	11·83	.....	.....	15 25	

TABLE II.—Results of the Examination of 65

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1901.		*Charlottetown P.E.I.*	*Analyst, M. Bowman, Halifax, N.S.*		p. c.	p. c.
April 18	20039	B. & M. Rattenbury.	Vendor	'Dried Blood'—		
				Guaranteed	.....	.....
				Standard sample	9·47	10·90
				Sample as sold	9·74	11·83
" 18	20040	A. Horn & Co	Swift's Lowell Fertilizer Co., Boston.	'Animal Brand'—		
				Guaranteed	.....	2·00
				Standard sample	1·66	2·02
				Sample sold	2·63	3·20
" 18	20041	"	" "	'Potato Manure'—		
				Guaranteed	.....	2·00
				Standard sample	1·57	1·90
		Pictou N.S.		Sample as sold	0·92	1·12
" 19	20042	J. W. D. Fraser	Bradley Fertilizer Co., Boston.	'Bradley's XL. Superphosphate'—		
				Guaranteed	2·06	2·50
		Truro N.S.		Standard sample	2·67	3·25
				Sample as sold	2·24	2·72
" 19	20043	J. H. Kent	Bowker Fertilizer Co., Boston, Mass.	'Farm and Garden Fertilizer'—		
				Guaranteed	.....	2·00
				Standard sample	2·21	2·68
		Kentville N.S.		Sample as sold	1·68	2·04
" 22	20044	DeWolf & Lamont	The Nova Scotia Fertilizer Co., Halifax	'Cere's Superphosphate'—		
				Guaranteed	.....	2·00
				Standard sample	1·97	2·40
		Windsor N.S.		Sample as sold	2·46	2·99
" 23	20045	E. C. Shand	Provincial Chemical Fertilizer Co., St. John, N.B.	'Imperial Superphosphate'—		
				Guaranteed	2·29	2·79
				Standard sample	2·52	3·06
		Dartmouth N.S.		Sample as sold	1·48	1·80
" 25	20046	E. M. Walker	The American Agricultural Chemical Co., Boston, Mass.	'Soluble Pacific Guano'—		
				Guaranteed	2·66	2·50
				Standard sample	2·38	2·89
				Sample as sold	2·35	2·86
" 25	20047	Colin McNab	....	'Thomas' Phosphate Powder'—		
				Guaranteed	.....	.....
				Standard sample	.....	.....
				Sample as sold	.....	.....
" 25	20048	W. McV. Smith	Provincial Chemical Fertilizer Co., St. John, N.B.	'Potato Phosphate'—		
				Guaranteed	2·63	3·19
				Standard sample	3·30	4·01
				Sample as sold	1·32	1·60
		St. John N.B.	*Analyst, F. T. Harrison, London, Ont.*			
" 16	17776	D. J. Seely & Son.	Bowker Fertilizer Co., Boston.	'Square Brand'—		
				Guaranteed	.....	2·00
				Standard sample	2·13	2·52
				Sample as sold	1·62	1·96

Sample of Fertilizers as sold in 1901.

Results of Analysis.							Relative value per ton of 2,000 lbs	Number of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Citric soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	.....	.....	.....	.....	20039	
.....	5·61	1 04	6·65	5·61	.....	17·25	29 94	.....	
0·74	4·07	1·59	6·40	4·81	.....	17.19	30 34	....	
.....	.....	.....	.....	8·00	3·00	.....	.....	20040	
4.48	4·49	0·63	9·60	8·97	3·29	7·44	17 51	... ..	
3·17	4·82	3·07	11·06	7·99	3·97	8·94	20 50	.....	
.....	.....	.....	.....	7·00	4·00	.....	.....	20041	
3.84	3·20	1·11	8·15	7·04	4·34	4·52	16 01	.....	
8·00	1·21	5·69	14·90	9·21	1·76	18·30	16 70	.....	Below guarantee in ammonia and potash.
5·00	3 00	2·00	10·00	8·00	1·50	... ...	16 41	20042	
6·40	4·09	1·60	12·09	10·49	3·52	12·08	22 77	.....	
6·41	2·43	2·83	11·67	8·84	.....	12·51	16 58	.....	
.....	.....	.....	10·00	8·00	2·00	.....	19 62	20043	
4·28	4·84	2·58	11·70	9·12	2·95	5·50	21 43	.. ..	Genuine.
5·89	3·44	2·82	11·15	9·33	2·25	19·30	18 09	... .	
.....	.....	.....	.....	.....	2·14	.....	.....	20044	
2·69	4·98	6·08	13·75	7·67	4·56	6·16	20 05	. .	
3·81	1·70	3·07	8·58	5·51	2·49	19·11	15 88	.....	
6·43	1·56	8·28	16·27	7·99	2·27	.....	19 80	20045	
7·50	3·26	6·64	17·40	10·76	2·35	9·10	23 10	.....	Below guarantee in ammonia.
4·83	2·81	7·40	15·04	7·64	1·84	12·76	16 39	.....	
5·00	3·00	2·00	10·00	8·00	1·50	.....	16 41	20046	
6·80	3·19	1·86	11·85	9·99	2·20	13·55	20 25	....	
5·69	2 05	2·53	10·27	7·74	1·64	18·94	17 21	.....	
.....	.....	.....	18·00	.....	.....	.....	.....	20047	
.....	9·80	9.71	19·51	9·80	.....	0·02	17 58	... .	
Trace.	11·05	6·33	17·28	11·05	.....	0·46	16 59	.....	
6 38	1·63	6·64	14·65	8·01	5·29	.....	23 30	20048	
6·97	2·57	5·86	15·40	9·54	6·49	8·25	27 68	.....	
6·04	2·68	5·34	14·06	8·72	3·67	12·50	18 82	.....	Below guarantee in ammonia and potash.
.....	.....	.....	12·00	6·00	2·00	....	... ...	17776	
2·05	6·97	3·38	12·40	9·02	2·66	3·45	18 52	.....	
1.53	4·90	5·05	11.48	6·43	2·82	7·75	15 59	....	Unadulterated

TABLE II.—Results of the Examination of 65

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total, calculated as Ammonia.
1901.		*St. John N.B.*	*Analyst, F. T. Harrison*—Con.		p. c.	p. c.
April 17	17777	Thomas Reid.....	Vendor	'Superphosphate of Lime'—		
				Guaranteed	... ...	.....
				Standard sample.....	4·83	5.86
				Sample as sold.....	4·26	5·17
" 17	17778	Provincial Chemical Fertilizer Co.	Vendors..	'Potato Phosphate'—		
				Guaranteed	2·63	3·19
				Standard sample..	3·30	4·01
		Sussex N.B.		Sample as sold.....	3·16	3·84
" 19	17779	J. A. McArthur ..	Swift's Lowell Fertilizer Co., Boston.	'Potato Phosphate'—		
				Guaranteed	.....	3·00
				Standard sample..... .	2·35	2·86
				Sample as sold.....	2·76	3·36
" 19	17780	J. A. Humphreys.	The Nova Scotia Fertilizer Co., Halifax	'Cere's Superphosphate'—		
				Guaranteed	.....	.....
		St. Andrews, N.B.		Standard sample.....	1·97	2·40
				Sample as sold.....	2·99	3·64
" 23	17781	G. D. Grimmer, Water St.	E. Frank Coe, Front St., New York.	'Grass and Grain'—		
				Guaranteed	.....	.....
				Sample as sold.....	1·19	1·25
" ..	17782	H. O'Neill, Water St.	Provincial Chemical Fertilizer Co., Ltd., St. John, N.B.	'Imperial Superphosphate'—		
				Guaranteed.....	2·29	2·79
				Standard sample	2·52	3·06
		St. Stephen, N.B.		Sample as sold.....	2·09	2·54
" 24	17783	Henry E. Hill, King St.	American Agricultural Co, New York.	'XL Superphosphate'—		
				Guaranteed	2·06	2·50
				Standard sample.....	2·67	3·25
				Sample as sold.....	2·73	3·31
" 24	17784	Hugh McKenna, King St.	Parmenter & Polsey Fertr. Co., Peabody, Mass.	'Plymouth Rock'—		
				Guaranteed	.....	... ...
				Sample as sold	3.33	4.04
		Montreal.	*Analyst, Dr. M. Fiset, Quebec.*			
" 6	19803	R. J. Latimer, rue McGill.	Nichols Chemi. Co., Capelton, Qué.	'Royal Canadian'—		
				Guaranteed	.....	4·00
				Standard sample.....	4·06	4·94
				Sample as sold..... ...	4·57	5·55
" 6	19804	"	"	'Victor'—		
				Guaranteed	.....	2·00
				Standard sample.....	2·36	2·87
				Sample as sold.....	1·86	2·26
" 6	19805	Brodie & Harris, rue Bleury.	Standard Chemical Fertr. Co., Smith's Falls, Ont.	'Standard'—		
				Guaranteed	....	2·50
				Standard sample.....	2·44	2·95
				Sample as sold.....	2·31	2·81
" 6	19806	"	"	'Special'—		
				Guaranteed	....	3·50
				Standard sample.....	3·15	3·82
				Sample as sold.....	2·93	3·55

Samples of Fertilizers as sold in 1901.—*Continued.*

Results of Analysis.							Relative Value per ton of 2,000lbs.	Number of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	.....	.....	.....	.....	17777	
1·80	4·50	3·60	9·90	6·30	1·87	15·60	21 74	.....	
1·72	3·79	5·24	10·75	5 51	.....	21·30	17 30	.....	Unadulterated.
6·38	1·63	6·64	14·65	8·01	5·29	.....	23 30	17778	
6·97	2·57	5·86	15·40	9·54	6·49	8·25	27 68	.....	
6·84	2·24	5·05	14·13	9·08	4 01	8·00	23 97	.....	"
.....	.....	.....	.....	8·00	6·00	.....	.....	17779	
2·56	5·59	1·12	9·27	8·15	8·00	4·96	22 82	.....	
6·20	1·48	1·53	9·21	7·68	6·45	7·47	22 92	.....	"
.....	.....	.....	.....	.....	2·14	.....	.....	17780	
2·69	4·98	6·08	13 75	7·67	4·56	6·16	20 05	.....	
3·96	2·50	2·49	8·95	6 46	2·56	14·95	18 12	.....	"
Not registered for 1901, therefore sold illegally.....							.....	17781	
6·78	2·24	2·36	11·38	9·02	2·01	15·02	16 06	.....	"
6·43	1·56	8·28	16·27	7·99	2·27	.....	19 80	17782	
7·50	3·26	6·64	17·40	10·76	2 35	9·10	23 10		
6·70	2·13	3·51	12·34	8·83	1·23	14·50	17 74	.....	"
5·00	3·00	2·00	10·00	8·00	1·50	.....	16 41	17783	
6·40	4·09	1·60	12·09	10·49	3·52	12·08	22 77		
8·00	2·43	1·02	11·45	10·43	2·29	15·07	21 53	.....	"
.....	Not registered for 1901, and therefore sold illegally.....							17784	
3·45	5·89	1·15	10·49	9·34	4·40	8·12	23 57	.....	"
.....	.....	.....	.....	9·00	5·00	.....	.....	19803	
9·30	0·62	3·08	13·00	9 92	5·23	4·90	27 99		
6·88	1·79	2·30	10·97	8·67	6·52	10·45	28 74	.....	Genuine and up to guarantee.
.....	.....	.....	.....	7·00	3·00	.....	.....	19804	
6·30	1·25	4·55	12·10	7·55	3·92	9·40	20 08		
6·07	3·00	3·99	13·06	9·07	3·50	12·62	18 92	.....	" "
.....	.....	.....	11·00	9 00	2·00	.....	.....	19805	
6·07	3·48	2·55	12·10	9·55	2 42	7·05	20 83		
7·67	1·93	2·71	12·31	9·60	2·90	12·05	20 72	.....	" "
.....	.....	.....	10·00	8·00	6·00	.....	.....	19806	
6·22	3·06	1·50	10·87	9·28	7·48	7·20	26 69		
8·36	1·34	2·77	12·47	9·70	6·65	11·05	26 34	.....	" "

TABLE II.—Results of the Examination of 65

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total, calculated as Ammonia.
1901.		*Quebec.*	*Analyst, Dr. M. Fiset.*—Con.		p. c.	p. c.
April 11	19807	P.-T. Legaré, St. Paul St.	Nichols Chemi. Co., Capelton, Que.	'Reliance'—		
				Guaranteed	.....	2·00
				Standard sample	2·35	2·85
				Sample as sold	2·08	2·53
" 11	19808	"	"	'Capelton Superphosphate'—		
				Guaranteed	.....	.....
				Standard sample	.....	.....
				Sample as sold	.....	.....
" 11	19809	"	"	'No. 1 Superphosphate'—		
				Guaranteed	.....	.....
				Standard sample	.....	.....
		Coaticook Que.		Sample as sold	Trace.	Trace.
" 12	19810	H. E. Baldwin, farmer.	American Agricultural Chemical Co., New York.	'Eclipse Phosphate'—		
				Guaranteed	1·03	1 25
				Standard sample	1·41	1·72
				Sample as sold	1·22	1·48
" 12	19811	"	"	'Standard'—		
				Guaranteed	0·82	1·00
				Standard sample	1·43	1·73
				Sample as sold	1·05	1·28
" 12	19812	"	"	'Potato Special'—		
				Guaranteed	2·06	2·50
				Standard sample	2·17	2·63
				Sample as sold	2·27	2·75
		East Stanbridge, Q.	*Analyst, E. B. Kenrick, Winnipeg.*			
" 16	19813	D. Phelps, farmer.	Bowker Fertr. Co.	'Potato & Vegetable Fertilizer'		
				Guaranteed	.....	2·00
				Standard sample	2·00	2·43
				Sample as sold	1 85	2·25
" 16	19814	"	"	'Square Brand'—		
				Guaranteed	.....	2·00
				Standard sample	2·13	2·52
				Sample as sold	1·85	2·25
" 16	19815	"	"	'Vermont Fertilizer'—		
				Guaranteed	.....	3·00
				Standard sample	2·64	3·21
		Waterloo P. Q.		Sample as sold	2·49	3·02
" 17	19816	Allen Taylor & Co.	Pacific Guano Co.	'Potato Special'—		
				Guaranteed	2·06	2·50
				Standard sample	2·17	2·63
				Sample as sold	2·46	2·99
" 17	19817	W. L. Whytcomb.	Read Fertilizer Co., New York.	'Samson'—		
				Guaranteed	.....	.....
				Standard sample	.....	.....
				Sample as sold	2·10	2·55

SESSIONAL PAPER No. 14

Samples of Fertilizers, as sold in 1901.—*Continued.*

Results of Analysis.									
Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs	Number of Sample.	Official Analyst's Remarks.
Soluble in Water.	Citric soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
.....	.....	.....	.....	6·00	2·00	.....	.....	19807	
5·58	1·55	4·82	11·95	7·13	2·72	5·05	18 35		
6·55	1·45	4·31	12·31	8·00	5·00	14·40	20 99	.....	Genuine and up to guarantee.
.....	.....	.....	.....	8·00	.....	.....	.....	19808	
8·20	0·90	5·10	14·20	9·10	.....	9·95	13 36		
8·00	0·96	6·23	15·19	8·96	0·50	12·78	13 05	.....	" "
.....	.....	.....	.....	11·50	.....	.....	.....	19809	
10·48	.....	4·70	15·18	10·48	.....	11·50	13 9		
7·83	2·72	5·27	15·82	10·55	0·49	13·62	14 14	.....	" "
6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	19810	
6·21	3·26	2 05	11·52	9·47	2·47	15·32	17 62		
7·19	2·73	1·75	11.67	9·92	2·30	15·85	17 57	.....	" "
5·00	3·00	2·00	10·00	8·00	4·00	.....	13 97	19811	
6·60	2·85	1·90	11·35	9 45	4·88	23·84	20 17		
4·32	4·33	2·56	11·20	8·65	4·25	17·30	17 69	.....	" "
5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	19812	
6·50	3·12	1·88	11·50	9·62	3·46	13·00	20 63		
5·12	3·84	1·75	10·71	8·96	3·68	15·35	20 19	....	" "
.....	.....	.....	11·00	9·00	2·00	.....	.....	19813	
4·40	5·00	2·30	11·70	9·40	2·14	6·15	19 04		
5·32	2 93	2·78	11·03	8·25	2·32	15·93	17 31	....	Genuine.
.....	.....	.....	12·00	6·00	2·00	.....	.....	19814	
2·05	6·97	3·38	12·40	9·02	2·66	3·45	18 52		
5·08	3·28	4·84	13·20	8·36	2·58	10·90	18 31	.....	"
.....	.....	.....	10·00	8·00	4·00	.....	.....	19815	
8·00	1·53	0·92	10·45	9·53	4·26	7·00	22 73		
4·74	3·05	4·01	11·80	7·79	4·25	14·44	20 69	.....	"
5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	19816	
6·50	3·12	1·88	11·50	9·62	3·46	13·00	20 63		
4·35	2·27	4·15	10·77	6·62	3·72	11·81	18 77	.....	"
.....	Not registered for 1901, and therefore sold illegally								
.....	.....	.....	.....	.....	.....	.....	.....	19817	
4·54	1·84	1·71	8 09	6·38	3 89	21·02	17 10	.....	"

TABLE II.—Results of the Examination of 65

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1901.		*Waterloo, Que.*	*Analyste, Dr. M. Fiset*—Con.		p. c.	p. c.
April 17	19818	W. L. Whytcomb.	Read Fertilizer Co., New York.	'Read's Leader'—		
				Guaranteed	0·82	1·00
				Standard sample	1·22	1·48
				Sample as sold	1·14	1·38
" 17	19819	"	"	'Farmers' Friend'—		
				Guaranteed	.....	.....
				Standard sample	.....	.....
		Farnham, Que.		Sample as sold	2·05	2·49
" 16	19820	G. Truax	Bradley Fertilizer Co	'Eclipse Phosphate'—		
				Guaranteed	1·03	1·25
			Analyste, Dr. F. X. Valade.	Standard sample	1·41	1·72
		Ottawa.		Sample as sold	1·00	1·21
" 1	20829	Graham Bros., florists.	The W. A. Freeman Co., Hamilton, Ont.	'Tankage'—		
				Guaranteed	.....	5·00
				Standard sample	7·36	8·94
				Sample as sold	4·34	5·27
" 1	20830	"	"	'Dominion Flower Fertilizer'—		
				Guaranteed	.....	.....
				Standard sample	.....	.....
		Smith's Falls, Ont.		Sample as sold	5·32	6·46
" 2	20831	The Standard Fertilizer and Chemical Co., Ltd.	Vendors	'No. 1 Fertilizer'—		
				Guaranteed	.....	2·00
				Standard sample	2·41	2·92
				Sample as sold	2·95	3·67
" 2	20832	"	"	'Standard Fertilizer'—		
				Guaranteed	.....	2·50
				Standard sample	2·44	2·95
				Sample as sold	2·24	2·72
" 2	20833	"	"	'Special Fertilizer'—		
				Guaranteed	.....	3·50
				Standard sample	3·15	3·82
		Brockville.		Sample as sold	2·95	3·67
" 3	20834	Brown & Co	Bradley Fertilizer Co	'Bone with Potash'—		
				Guaranteed	.....Taken from	
				Standard sample	.....	.....
				Sample as sold	1·54	1·87
" 3	20835	"	"	'Potato Fertilizer'—		
				Guaranteed	2·06	2·50
				Standard sample	2·23	2·70
		Belleville, Ont.		Sample as sold	2·10	2·55
" 3	20836	The Belleville Canning Co.	"	'Guano'—		
				Guaranteed	.....Taken from	
				Standard sample	.....	.....
				Sample as sold	1·96	2·38

Samples of Fertilizers as sold in 1901.—*Continued.*

Results of Analysis.							Relative value per ton of 2,000 lbs	Number of Sample.	Official Analyst's Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Citric soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
5·00	2·00	1·00	8·00	7·00	1·00	.....	11 52	19818	
3·10	5 25	2·95	11·30	8·35	3·07	11·02	15 53		
5·03	2·49	2·84	10·36	7·52	2·18	20·25	14 66	.....	Genuine.
.....	Not registered for 1901, and therefore sold illegally.						.....	19819	
.....	.....	.....	.....	.....	.....	.....	.....	.....	
7·13	1·49	2·44	11·06	8·62	2·00	16·58	17 96	.....	"
6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	19820	
6·21	3·26	2·05	11·52	9·47	2·47	15·32	17 62		
6·35	2·54	3·27	12·16	8·89	2·23	16·77	16 75	.....	"
.....	.....	.....	12·00	.....	.....	.....	.....	20829	
.....	10·96	3·04	14·00	10·96	.....	4·70	32 76		
0·92	8·70	2·40	12·02	9·62	0·70	5·90	24 23	....	"
.....	.....	....Not registered for 1901			.....	.... ..	.....	20830	
.....	.....	.....	.....	.....	.....	.....	.....	.....	
6·10	2·74	2·25	11·09	8·84	5·24	5·04	29 27	... ..	"
.....	.....	.....	11·00	9·00	1·00	.. ..	.....	20831	
6·51	3·27	2·30	12·10	9·78	1·21	5·70	19 23		
7·10	1·88	2·13	11·11	8·98	1·35	13·10	19 73	.....	"
.....	.....	.....	11·00	9·00	2·00	.....	.....	20832	
6·07	3·48	2·55	12·10	9·55	2 42	7·05	20 83		
7·86	1·28	1·57	10·71	9·14	2·33	15·03	19 14	. .	"
.. ..	.....	.....	10·00	8·00	6·00	.....	.....	20833	
6·22	3·06	1·50	10·87	9·28	7·48	7·20	26 69		
6·84	1·12	1·73	9·69	7·96	6·76	12·35	24 13	.....	"
last year's stock, not registered for 1901, and therefore sold illegally.								20834	
.....	.....	.....	.....	.....	.....	.....	.....	.....	
5·63	3·42	2·25	11·30	9·05	2·55	13·06	17 57	.. .	"
5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	20835	
6·72	2·87	2·05	11·64	9·59	3·96	12·76	21 34		
4·48	4·50	0·92	9·90	8 98	2·94	14·38	18 73	.....	"
last year's stock, not registered for 1901, and therefore sold illegally.								20836	
.. ..	.....	.....	.....	.....	.....	.....	.....	.....	
6·65	1·96	1·70	10·31	8·61	1·45	16·67	16 87	.....	"

TABLE II.—Results of the Examination of 65

Date of Collection.	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total including that of Nitric Acid or Ammonia if present.	Nitrogen. Total calculated as Ammonia.
1901.		*Belleville*—Con.			p. c.	p. c.
April 4	20837	C. E. Bishop.. ...	.....	'Thomas' Phosphate Powder'—		
				Guaranteed	.....	.....
			Analyst, Dr. W. H. Ellis, Toronto.	Standard srmple.....	.....	.....
		Smith's Falls, Ont.		Sample as sold.....	.....	.....
" 2	20838	The Standard Chemical & Fertilizer Works.	Vendor....	'The Royal'—		
				Guaranteed	.....	2·00
				Standard sample.....	2·83	3·43
				Sample as sold.....	1·82	2·21
" 2	20839	" ..	"	'Corn & Grass'—		
				Guaranteed	.....	2·00
				Standard sample.....	2·77	3·37
				Sample as sold..	2·30	2·78
" 2	20840	" ..	"	'Superphosphate of Lime'—		
				Guaranteed	.....	
				Standard samplc.....		.....
				Sample as sold.....	.....	... .
		Belleville, Ont.				.....
" 4	20841	The Belleville Canning Co.	Bradley Fertilizer Co.	'Potato Fertilizer'—		
				Guaranteed	2·06	2·50
				Standard sample.....	2·23	2·70
				Sample as sold..... ..	2·31	2·89
" 4	20842	" ..	" .. .	'Complete Manure for Potatoes'		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
		Cobourg, Ont.		Sample as sold.....	4·94	6·00
" 4	20843	Geo. Thompson...	.....	'Thomas' Phosphate'—		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
				Sample as sold.....	.....	.....
" 4	20844	"	Bradley Fertilizer Co.	'Guano'—		
				Guaranteed	.....	.....
				Standard sample.....	.....	.....
		Toronto.		Sample as sold.....	2 32	2·82
" 6	20845	J. A. Simmers, 147 rue King.	W. A. Freeman Co., Hamilton.	'Sure Growth'—		
				Guaranteed	.....	3·50
				Standard sample..... ..	3·44	4·18
				Sample as sold..	5·14	6·24
" 6	20846	"	"	'Bone Meal'—		
				Guaranteed	.....	3·00
				Standard sample.....	3·67	4·45
				Sample as sold.....	3·96	4 81
6	20847	"	W. Harris & Co., Toronto.	Brand 'H'—		
				Guaranteed	.....	.....
				Standard sample.....	7·56	9 18
				Sample as sold.....	8·59	10·44

SESSIONAL PAPER No. 14

Sample of Fertilizers as sold in 1901—*Continued.*

Results of Analysis.							Relative value per ton of 2,000 lbs	Number of Sample.	Official Analyst's Remarks.
Phosphoric Acid-					Potash.	Moisture.			
Soluble in Water.	Citric soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
. . ..	.....	... .	18·00	.....	.....	.....	... ...	20837	
.....	9·80	9·71	19·51	9·80	.....	0·02	17 58		
..... .	10·10	7·25	17·35	10·10	.....	0·27	16 19	.....	Genuine.
.....	.....	.....	9·00	8·00	3·00	.....	... ...	20838	
7·04	3·32	0·64	11·00	10·36	3·79	6·12	23 06		
7·06	2·75	2·97	12·78	9·81	2·93	12·94	21 91		
.....	.....	.....	9·00	7 00	4·00	.....	... ..	20839	
6·85	2·88	1·15	10·88	9·73	5·74	5·02	24 41		
7·85	1·50	3·98	13·33	9·35	3·20	13·08	21 14		Up to standard and guarantee in phosphoric acid and nitrogen. Below guarantee in potash.
.....	.....	.....	16·00	14·00	.....	.....	.....	20840	
2·66	1·74	2·55	16·95	14·40	.....	6·65	17 87		
6·32	9·35	4·04	19·71	15·67	.....	11·88	19 07		Up to guarantee.
5·00	3·00	2·00	10·00	8·00	3·00	.....	17 99	20841	
6·72	2·87	2·05	11·64	9·59	3·96	12·76	21 34		
5·23	7·48	4·72	17·43	12·71	3·46	5·98	25 10		Up to guarantee.
		Not registered under this name..							
.....	.....	.....	.....	.....	.....	.....	.. ....	20842	
.....	.....	.....	.....	.....	... ...	.....	... ..		
5·47	3·49	2·34	11·30	8·96	6·76	10·75	30 06		
.....	.....	.....	18·00	.....	.....	.....	.....	20843	
.. ..	9·80	9·71	19·51	9·80	.....	0·02	17 58		
.....	12·26	6·42	18·68	12·26	.....	0·20	17 98		Up to guarantee.
	Not registered for 1901, and therefore sold illegally.								
.....	....	.....	... ..	.....	.....	.. ...	.....	20844	
.....	.....	.....	.....	.....	.....	.....	... ...		
5·06	3·29	5·40	13·75	8·35	1·83	11·71	18 80		
.....	.....	.....	8·00	.....	3·00	.....	... .	20845	
6·08	2·62	1·00	9·70	8·70	5·44	2·49	24 45		
6·10	2·49	3·41	12·00	...	3·50	13·59	26 89		Up to guarantee.
.....	.....	.....	23·00	.....	... ...	. ...	.....	20846	
0·23	13·65	8·72	22·60	13·88	.. ....	7·30	32 82		
Trace.	9.07	14·16	23·23	9·07	0·33	7·55	33 98		Up to guarantee.
.....	.....	... .	.....	.....	.....	.....	.....	20847	
... ...	7·50	2·80	10·30	7·50	....	8·45	27 23		
Trace.	3·31	2·60	5·91	3·31	0·30	14·56	25·35		

TABLE II.—Results of the Examination of 65

Date of Collection	Number of Sample.	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Nitrogen. Total, including that of Nitric Acid or Ammonia if present.	Nitrogen. Total, calculated as Ammonia.
1901.		*Stratford. Ont.*	*Analyst, F. T. Harrison, London, Ont.*		p. c.	p. c.
Mar. 29	19483	W. R. Marshall & Co.	Bradley, Fertilizer Co.	Dissolved Bone— Guaranteed Standard sample Sample as sold	 0·21	 0·25
" 29	19484	Hodd & Cullen.... *St. Thomas, Ont.*		'Thomas' Phosphate Powder'— Guaranteed Standard sample Sample as sold	 	
" 30	19485	J. Marlatt.....	American Agricultural Chemical Co., Rochester, N.Y.	'New Method Fertilizer,'— Guaranteed Standard sample Sample as sold	1·03 1·34 1·22	1·25 1·63 1·48
April 1	19486	Ingersoll Packing Co., Ont.	Vendors.....	'Ingersoll Fertilizer'— Guaranteed Standard sample Sample as sold	 7·97 7·63	9·00 9·67 9·28
" 2	19487	W. A. Freeman Co., Hamilton.	"	'Sure Growth'— Guaranteed Standard sample Sample as sold	 3·44 4·16	3·50 4·18 5·05
" 2	19488	" *St. Catharines, Ont.*	"	'Bone and Potash'— Guaranteed Standard sample Sample as sold	 2·53 3·60	2·00 2·46 4·37
" 3	19489	Titterington & Co. *Niagara Falls, Ont*	Bradley, Fertilizer Co.	'B. D. Sea Fowl Guano'— Guaranteed Standard sample Sample as sold	 2·15	 2·62
" 3	19490	L. H. Taylor..... *Woodstock, Ont.*		'Thomas' Phosphate Powder'— Guaranteed Standard sample Sample as sold	 	
" 4	19491	Edwin Hersey....	W. Harris & Co., Toronto.	'Ground Bone'— Guaranteed Standard sample Sample as sold	 4·54 4·45	 5·51 5 40

SESSIONAL PAPER No. 14

Samples of Fertilizers as sold in 1901—*Concluded.*

Results of Analysis.									
Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs	Number of Sample.	Official Analyst's Remarks.
Soluble in Water.	Citric soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	$ cts.		
Not registered for 1901, under this name, and therefore sold illegally...								19483	
.....	.....	.....	.....	.....	.....	.....	.....		Unadulterated.
6·27	4 80	2·94	14 01	11·07	.....	7·87	16·24		
.....	.....	.....	18·00	.....	.....	.....	.....	19484	"
.....	9·80	9·71	19·51	9·80	.....	0·02	17·58		
.....	12·73	2·43	15·16	12·73	.....	0·40	15·70		
6·00	2·00	2·00	10·00	8·00	2·00	.....	14 57	19485	"
5·89	4·02	1·73	11·64	9·91	3·03	15·14	18 41		
4·28	2·37	4·99	11·64	6·65	2·56	14·80	14 87		
.....	5·50	6·80	.....	.....	.....	8·00	.....	19486	"
.....	10·40	0 80	11·20	10·40	0·64	8·10	32 04		
0·45	8·50	3·20	12·15	8·95	0·31	7·00	31 72		
.....	.....	.....	8·00	.....	3·00	.....	.....	19487	"
6·08	2·62	1·00	9·70	8·70	5·44	2·49	24 45		
4·22	3·20	3·77	11·19	7·42	2·71	12·65	22 54		
.....	.....	.....	9·00	.....	6·00	.....	.....	19488	"
5·95	2·48	2·32	10·75	8·43	8·47	4·17	24 43		
3·58	2·69	3·26	9·53	6·27	9·50	12·10	26 88		
Not registered for 1901, under this name, and therefore sold illegally...									
.....	.....	.....	.....	.....	.....	.....	.....	19489	"
4.35	3·58	3·26	11·19	7·93	1·10	15·07	16 48		
.....	.....	.....	18·00	.....	.....	.....	.....	19490	"
.....	9·80	9·71	19·51	9·80	.....	0·02	17 58		
.....	12·47	3·96	16·37	12·47	.....	0·25	16 84		
.....	.....	.....	.....	.....	.....	.....	.....	19491	"
.....	11·34	6·96	18·30	11·34	.....	1·80	30·33		
.....	14·76	5·24	20·00	14·76	.....	4·22	32·16		

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, December 31, 1900.

THOS. MACFARLANE, Esq., F.R.S.C., &c.,
Chief Analyst.

SIR,—In accordance with your request, I have made a study of certain modifications of official methods in the analysis of fertilizers proposed by you, having reference to the determination of phosphoric acid in its different combinations. I beg to submit herewith a synopsis of the result of my work.

CLASSIFICATION OF PHOS. ACID IN FERTILIZERS.

The phosphoric acid present in commercial fertilizers is valued differently according as it is (1) soluble in water; (2) insoluble in water, but soluble in neutral citrate of ammonia; (3) insoluble in either menstruum. These three classes are commonly spoken of as (1) *soluble phosphoric acid*, supposed to be that present in the free state, or combined with lime as monocalcium phosphate; (2) *reverted phosphoric acid*, supposed to be that present as the di-calcium phosphate; (3) *insoluble phosphoric acid*, or that present as tri-calcium phosphate. The soluble and reverted phosphoric acid together are usually styled *available phosphoric acid.*

OBJECT OF INVESTIGATION.

The object of the following work is to determine how the distribution of the total phosphoric acid present in a given fertilizer will be affected by using *one* and *two* per cent citric acid instead of neutral ammonium citrate; also, in the case of basic slags, what will be the effect of separating free lime by solution of chloride of ammonium, before applying citric acid, and finally the influence of different methods of applying the solvents.

PRECAUTION AS TO SAMPLING.

In order that the results may be interpreted with confidence, it is necessary to determine the magnitude of the variation introduced by sampling as this process is defined by the Association of Official Agricultural Chemists (Washington, 1898). These require that the prepared sample should pass through a sieve, having circular perforations of one millimetre diameter (one twenty-fifth of an inch). Such a degree of fineness is easily attainable, even with moist fertilizers, containing fibrous matter. It is, however, much too coarse to permit of exact duplicate portions of two grams being weighed out, and is, besides, very indefinite. For two portions (say 25 grams each) of a given sample may be so ground that while each fulfils the condition of passing entirely through a 1 mm sieve, 90 per cent of one portion shall pass through a 0·25 mm sieve, while not 10 per cent of the second portion does so. An important consequence of this coarse and irregular grinding is that it is impossible to weigh out successive portions of two grams such that exact duplicate estimations of phosphoric acid (or other constituent) are obtained on analysis.

SUGGESTION AS TO FINENESS.

It is much to be desired that samples should be ground to a fineness determined by the whole passing through a sieve of, say, 60 meshes per inch. This can only be done, in most cases, by artificially drying the sample before grinding, a condition which might affect the classification of the contained phosphoric acid. That the changes brought about by drying the sample are very slight, is evident from some results in soluble and reverted phosphoric given in the tables. (Ex. 7-27).

The following samples were employed in this work :—

DESCRIPTION OF SAMPLES.

No. 1045—Bradley's XL Superphosphate—

Contains—Total phosphoric acid ($P_2 O_5$)	13·32
" nitrogen	2·29
" potash ($K_2 O$)	2· 9
" moisture	8·40

No. 1074—Capelton Superphosphate—

Contains—Total phosphoric acid ($P_2 O_5$)	15·02
" moisture	8·85

No. 1114—Reid's Superphosphate—

Contains—Total phosphoric acid ($P_2 O_5$)	15·19
" nitrogen	3·71
" potash ($K_2 O$)	1·69
" moisture	26·46

This fertilizer was too wet to be satisfactorily sampled, and was dried, before grinding, so that the material prepared for analysis contained 17·15 per cent water.

No. 1088—Superphosphate of Lime—

Contains—Total phosphoric acid ($P_2 O_5$)	25·52
" moisture	6·80

No. 1090—No. 1 Fertilizer, Standard Chemical Co.—

Contains—Total phosphoric acid	22·52
" nitrogen	1·41
" potash ($K_2 O$)	1·68
" moisture	8·50

No. 1057 } Thomas' Phosphate Powder—
" 1128 }
Contain only traces of moisture.

PREPARATION OF SAMPLES.

The portions taken for analysis were ground to the following degrees of fineness:—

No. 1045—All passed through a sieve of 40 meshes per inch, and over 50 per cent through a sieve of 60 meshes.

No. 1074—All passed through a 40 mesh sieve, and 80 per cent through a 60 mesh.

No. 1114—75 per cent passed through a 40 mesh sieve, and about 50 per cent through a 60 mesh. The coarser portion (about 25 per cent of the whole) consisted of scraps of skin, hairs and miscellaneous organic debris.

No. 1088 } —All passed through a 40 mesh sieve, and about 75 per cent through a
" 1090 } 60 mesh.
" 1057 } —All passed through a 40 mesh sieve, and more than 90 per cent through
" 1128 } a 60 mesh.

ESTIMATION OF $P_2 O_5$.

All determinations of phosphoric acid were made by molybdate. Most of the work was done by titration of the yellow precipitate with standard potash and nitric acid, but many estimations were checked by the magnesia method.

I have found, by a long series of titrations of solutions containing known amounts of phosphoric acid, that the process, in my hands, involves a possible mean error of about 0·1 per cent $P_2 O_5$. Hence, the results in the following tables cannot be safely interpreted within narrower limits than this.

HOW STATED.

All the results tabulated are stated as percentage numbers calculated on the dry material.

THE ROTATOR.

The 'Rotator,' used in many of the experiments recorded, is a wheel of wood, 15 inches in diameter, to which 4 Erlenmeyer's of 300 cc. can be radially attached. The surface of the wheel is cut out in such a way that the Erlenmeyer is fitted into the depression, where it is held by rubber bands passing over small brass hooks screwed into the wheel. This wheel is driven by a small water motor at the rate of 30—40 revolutions per minute. Owing to fluctuations in our water pressure, it has occasionally happened that the rate has been reduced to 20 per minute, which may account for certain irregular results.

VARIATION DUE TO SAMPLING.

TABLE I.—Variations due to Imperfect Sampling.

Serial Number of Experiment.	Sample 1045.	Sample 1074.	Sample 1114.	Sample 1057.	Sample 1128.
1.	13·25	15·09	15·48	17·91	17·40
2.	13·43	14·75	15·10	17·70	17·56
3.	13·50	15·22	15·06	.....	.....
4.	13·11	.....	15·30	.....	.....
5.	13·34	.....	15·00	.....	.....
Total mean $P_2 O_5$.	13·32	15·02	15·19	17·80	17·48
	.....	.....	.....	.....	.....

Each estimation was made upon a separate solution of two grams in nitro-hydrochloric acid. In the basic slags a considerable excess of hydrochloric acid was used, and subsequently got rid of by evaporation. The maximum deviations from mean value are as follows:—

0·21 0·27 0·29 0·11 0·08

It has already been noticed that an error of about 0·1 may be due to the method of working. This leaves an additional error of somewhat larger amount to be accounted for by the sampling.

SOLUBLE $P_2 O_5$ BY OFFICIAL METHOD.

TABLE II.—Soluble phosphoric acid.

Experiment.	1045.	1074.	1114.	——
7.	5·83	6·65	2 25	Made on anhydrous sample.
8.	5·85	6·40	2·15	
9.	5·73	6·55	2·22	
Mean.	5·80	6·53	2·21	
10	5·75	7·36	1·30	Made on normal sample.
11.	5·70	7·00	1·16	
12.	5·78	6·67	.....	
13.	.....	6·86	.....	
Mean.	5·73	6·97	1·23	

The estimations of soluble phosphoric acid recorded in Table II. were made by treating two grams of the sample on a 9 c m filter with water until the filtrate measured 250 cbc. The first three estimations in each sample were made upon the material dried at 100° C. It will be seen that in samples 1045 and 1114 a slightly higher percentage of soluble phosphoric acid is obtained when dry material is used, while in 1074 the undried material yields more phosphoric acid to water. This last is a superphosphate made from apatite.

SOLUBLE P_2O_5 BY 5 P.C. NH_4 Cl.

The following table gives the results of using a 5 per cent solution of ammonium chloride, instead of water, to wash out the soluble phosphoric acid.

TABLE III.

Experiment.	1045.	1074.	1114.	1088.	1090.
21	5·75	7·25	2·23	7·42	6·02
22	5·93	6·96	2·83	.....	.....
23	.....	.....	2·78	.....	.....
Mean	5·84	7·10	2·53	7·42	6·02

SOLUBLE P_2O_5 BY ROTATOR.

The phosphoric acid dissolved in thirty minutes from two grams, by 100 cbc water, applied by means of the rotator, was as follows (in 1088 and 1090, 5 per cent solution ammonium chloride was used) :—

TABLE IV.

Experiment.	1045.	1074.	1114.	1088.	1090.
19	5·40	6·56	2·22	7·39	6·00
20	5·32	.....	.....	.....	.....
Mean	5·36	6·56	2·22	7·39	6·00

These experiments show that a 5 per cent solution of ammonium chloride may be used instead of water to dissolve phosphoric acid without materially affecting the results. The following synopsis of results, as far as soluble phosphoric acid is concerned, makes comparison easy.

SYNOPSIS.

SOLUBLE P_2O_5.

Method.	1045.	1074.	1114.	1088.	1090.
Official method on dry sample	5·80	6·53	2·21	.....	.....
" " normal sample	5·73	6·97	1·23	.....	.....
Ammonium chloride solution	5·84	7·10	2·53	7·42	6·02
Use of rotator, 30 min	5·36	6·56	2·22	7 39	6·00

Reverted Phosphoric Acid.

In the following series of experiments a solution of neutral citrate of ammonia (as per official instructions) was used to dissolve the so-called reverted phosphoric acid. In Experiments 14 to 18, inclusive, this was applied as directed by the official regulations; in Experiments 26 and 27 the solution was applied by the rotator during 30 min.; in 31 and 32 the solution of ammonium citrate was applied to the sample after treatment with solution of ammonium chloride to remove free lime.

REVERTED P_2O_5 BY AMMONIUM CITRATE.

Table V.

Experiment.	1045.	1074.	1114.	1057.	1128.	1088.	1090.
14	4·61	4·71	8·04	7·88	8·36	.....	.....
15	4·73	5·16	6·90	7·48	8·20	.....	.....
16	4·71	4·15	7·53	.....	.....	.....	.....
17	4·71	4·02	6·85	.....	.....	1·31	2·27
18	4·92	4·1	7·25	.....	.....	1·25	2·52
Mean	4·74	4·51	7 31	7·68	8·28	1·28	2·40
26	4·19	2·51	8·35	.....	.....	1·44	2·33
27	4·18	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	11·25	.....	.....	.....
32	.....	.....	.....	11·25	.....	.....	.....

Notes.—In Experiments 14 to 16, dry material was used, *i.e.*, residues from Experiments 7 to 9. In 17 and 18, residues from 10 and 11. In 26 and 27, residues from 19 and 20.

In the following series (Table VI.) a 2 per cent solution of citric acid was used to dissolve the reverted phosphoric acid. In 28 and 29, 200 cc. solution was used on the rotator for 30 min.; in 30, for one hour.

REVERTED P_2O_5 BY 2 PER CENT CITRIC ACID.

Table VI.

Experiment.	1045.	1057.	1128.
28	2·84	12·28	13 36
29	.....	11·92	12·80
30	.....	13·34	.....
	2·84	12·51	13·08

Notes.—In 1057 and 1128 the free lime was previously removed by chloride of ammonium. In 1045 the soluble acid was removed by water.

In the following series (Table VII.) a 1 per cent solution of citric acid was employed, 200 cbc being used (except in Experiments 33 and 34), with the rotator, during periods varying from thirty minutes to two hours.

REVERTED P_2O_5 BY 1 PER CENT CITRIC ACID.

TABLE VII.—Results with 1 per cent Citric Acid.

Experiment.	1045.	1074.	1114.	1057.	1128.	1088.	1090.	Period.
24	4·91	1·45	10·60	12·55	12·43	2·97	4·49	200 cbc. applied for one hour, with the Rotator.
25	....	0·82	.....	12·62	12·45	3·08	4·53	
37	.....	....	.....	12·88	...	... .	.....	
38	. . .	.....	. . ...	12·92	12·16	. ....	... ..	
42	.. ..	.....	...	12·60	....	.....	.....	
Mean	4·91	1·14	10 60	12·71	12·35	3·03	4·51	
35	....	.....	.....	13·36	12·64	.....	.....	One and a half to two hours.
39	.....	. .	.....	12·64	....	....	.....	
40	.....	.....	.	12·84	11·96	.....	....	
Mean	.....	.. .	....	12·95	12·30	. ..	.. ..	
36	.....	.....	.....	12·32	.....	.....	.....	One-half hour.
41	...	. ..	.....	11·48	.. ..	....	....	
Mean		.. .	.....	11·90	....	.....	.. ..	
33	....	.....	... .	7·26	7·12	.....	.....	100 cbc.
34	.....	..	. ..	8·64	....	.....	.....	
Mean	....	.....	...	7·95	7·12	.....	.....	

CONCLUSIONS.

The following conclusions seem to be justified by the work recorded :—

1. A variation of nearly 1 per cent of so-called 'reverted' P_2O_5 occurs in applying the ammonium citrate method to different portions of the same sample in acid fertilizers. (See Table V.)

2. The application of 1 per cent citric acid to this class of fertilizers gives varying results. (See Nos. 1045, 1074 and 1114 in Table VII.) In 1045 the difference is negligible. In 1074 the citric acid is only one-fourth as effective as ammonium citrate ; in 1114 it is decidedly more effective.

It occurred to me that an explanation of this phenomenon might be found in the mode of occurrence of the phosphate of lime. I obtained the following results with a sample of Bone Meal (furnished by H. A. McNutt, Truro, N.S.):—

	Per cent.
Moisture	2·25
Water soluble P_2O_5	0·10
Total P_2O_5	21·91
Reverted P_2O_5—	
By neutral ammonium citrate	8·32
By 1 per cent citric acid	15·81

These results show citric acid to be a more effective solvent for reverted phosphoric acid in ground bones, and suggest the existence of bone meal in No. 1114. This is found to be the fact. No. 1074 is, on the contrary, a mineral phosphate. In this behaviour towards citric acid may lie a mode of ascertaining the origin of the phosphoric acid in a given fertilizer.

3. In basic slags from which the lime has been partially removed by washing with water (as in the official method for dissolving soluble phosphoric acid) neutral citrate of ammonia dissolved 7·68 and 8·28 per cent P_2O_5. (Ex. 14 and 15.) Applied to a lime free slag, citrate of ammonia extracted 11·25 per cent P_2O_5. (Ex. 31 and 32.) Two per cent citric acid dissolved respectively 12·51 and 13·08 per cent P_2O_5. (Ex. 28 to 30, Table VI.)

The effectiveness of 1 per cent citric acid on lime free slags is influenced (1) by the quantity of the solvent; (2) by the time during which this is applied. (See Table VII.)

4. One per cent citric acid solution is nearly as effective as two per cent in removing P_2O_5 from slags in which the caustic lime has been washed out.

Removal of CaO.

Table VIII. contains a record of experiments to determine the efficacy of solutions of chloride of ammonium in removal of basic lime from slags.

Table VIII.

Removal of CaO in Basic Slag—CaO expressed as p,c. on dry sample.

Experiment.	Conditions.	Lime (CaO).		Remarks.
		1057	1128	
1	2 grms. on 9 cm. filter, washed with water till filtrate measured 250 cc.	4·25	.....	
2	2 grms. boiled with NH_4Cl. solution under condenser.	10·75	.. .	2½ p.c. solution, 1 hour.
3	" " " "	9·10	.....	20 " "
4	2 grams. + 100 cc. NH_4Cl. solution in 'rotator'	10·20	.....	2½ " "
5	" " " "	9·75	.....	5 " "
6	" " " "	9·00	.....	10 " "
7	" " " "	9·00	.....	20 " "
8	" " " "	9·75	4·65	10 " "
9	2 grms. + 100 cc. shaken by hand at five minute intervals	9·70	4·95	10 " "
10	2 grms. + 100 cc. 2½ p.c. solution NH_4Cl. in 'rotator'	7·20	4·10	2½ " "
11		7·30	4·30	2½ " "
12		7·35	.....	2½ " "
13	2 grms. + 100 cc. 5 p.c. NH_4Cl. solution in 'rotator' for one hour	7·30	3·90	5 " "
14		7·80	3·90	5 " "
15	2 grms. on 9 cm. filter washed with 5 p.c. NH_4Cl. solution till filtrate = 250 cc.	8·80	5·00	5 p.c. solution to 250 cc.
16		9·00	4·80	5 " "

Note.—Most of the lime precipitates were slightly discoloured by Fe_2O_3; but the amount of iron was trifling.

Experiment 1 shows that in a slag containing about 10 per cent of caustic lime nearly half of this may be removed by washing with water, as in solution of soluble phosphoric acid by official methods. In the resulting solution 0·2 gram CaO is dissolved in 250 cbc, or a 0·08 per cent solution of CaO is obtained. Since the solubility of CaO in water is about 0·12 per cent, such a liquid is about two-thirds saturated.

The remaining experiments go to prove that solutions of chloride of ammonium answer very well the purpose of removing the CaO. The efficiency of the solvent is not greatly increased by an increase in its strength above 2½ per cent. Five per cent is a very convenient strength to use, and has been employed in most of these experiments.

No advantage results from boiling the solution; and it is much more convenient to use it cold, with mechanical agitation. The maximum, minimum and mean CaO remov-

ed from these slags by 100 cc. of a 5 per cent NH_4 Cl. solution, used cold, by mechanical agitation for one hour, is as follows :—

	No. 1057.	No. 1128.
Maximum	9·75	3·90
Minimum	7·30	3·90
Mean	8·28	3·90

The greatest variations observed in CaO removal, irrespective of the details of manipulation, are as follows:—

	No. 1057.	No. 1128.
Maximum	10·75	5·00
Minimum	7·20	3·90
Difference	3·55	1·10

The following general conclusions may be noted :—

I. No important difference in the amount of soluble $P_2 O_5$ in acid fertilizers is obtained by the substitution of chloride of ammonium solution for water, as officially prescribed.

II. The substitution of 1 per cent citric acid for neutral citrate of ammonia in acid fertilizers brings about changes in the amount of $P_2 O_5$ dissolved, which seem to depend upon whether the phosphoric acid has come from a mineral or an animal source.

III. In basic slags a 5 per cent solution of ammonium chloride forms an effective solvent for the free lime, and does not dissolve $P_2 O_5$. It is a matter of indifference whether the solution be used hot or cold

IV. Citric acid of 1 per cent strength is practically as efficient a solvent of $P_2 O_5$ as a 2 per cent solution in lime free slags. Neutral citrate is somewhat less efficient, as shown by the following:—

	No. 1057.	No. 1128.
Mean $P_2 O_5$ by 2 per cent citric acid	12·51	13·08
" by 1 " "	12·80	12·16
" by ammonium citrate	7·68	8·28
" by 1 per cent citric acid applied for two hours	12·95	12·30

I have the honour to be, sir,
Your obedient servant,

A. McGILL.

December 31, 1900.

MEMORANDA ON MANURES.

Since this bulletin is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared regarding the application of natural manures and artificial fertilizers.

It is nearly fifty years since Stoeckhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarassment and possibly ruin

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for, when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it. As regards the best way of doing this, Hellriegel has related his experience. He recognizes how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to *see* a distinct difference between the unmanured plots and the manured fields, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the development of the grains. In the event of such a distinct difference being invisible the manure is justly discredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every years would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of fertilizers applied afterwards.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

In many of the fertilizers described in this and former reports, their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the nitrogen of the atmosphere. Nevertheless the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from $8 to $14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables or produce upon his own farm.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one-half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable-yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff, this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The later experiments of Heiden and Holdefleiss place it at 23·4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when,

as is very frequently the case in Canada, the manure is treated with the grossest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the barn-yard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 pounds is produced in fresh condition annually by each animal, and that it contains 0·4 per cent of nitrogen, it follows that a loss of 72 pounds of nitrogen, worth $8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with two pounds of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about $2.50 annually for each 1,000 lbs. live weight, but, by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg 1859, entitled *Ein Pfund Stickstoff kaum einen Groschen*, which may be freely translated 'A pound of nitrogen for a penny,' Dr. Meyer Altenberg maintained that ground gypsum is the very best preservative of barn-yard manure when applied in the stable, because it secures 'certainty and completeness of effect, ease of execution, and the lowest possible cost.' He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out that the use of gypsum, without subsequent careful treatment of the dungheaps, does not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. Koënig's prize essay, 'How can the farmer preserve and increase the stock of nitrogen on his property?' (Berlin, 1887.) In a special chapter of this work the author discusses 'The evolution of free nitrogen during the fermentation and storage of stable manure,' describes the experiments which were made from 1860 to 1885 regarding its treatment and gives finally the results of the discussion from which the following sentences may be translated with advantage:—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.

2. This loss is the greater the more the atmosphere has access to the decomposing mass.

3. Too much moisture is just as hurtful as too little. Stable manure requires such a degree of humidity as permits its components to lie close to each other.

4. The addition of substances which fix ammonia (such as gypsum, kainite and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little or no value if care is not taken at the same time to prevent as much as possible the access of air.*

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

One thing in connection with this question is perfectly certain, and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further, if the work from which the foregoing quotations have been made be carefully studied, and also the experiments and writings of Holdefleiss, Vogel and others, it appears to be quite certain that the use of the same article, or of the gypsum produced in the manufacture of 'acid-phosphate,' completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the

safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure, after treatment with gypsum, on to the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past at the Central Experimental Farm by Director Saunders. (See Reports for 1898.)

Not only has the addition of substances which have the faculty of fixing ammonia been recommended for stable manure, but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March, 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessman, Chemist for that institution :—

'*The practice of adding to the manurial refuse materials of the farm as stable manure, vegetable compost, &c., such single commercial manurial substances as will enrich them in the direction desirable for any particular crop to be raised, does not yet receive that degree of general attention which it deserves.* (The italics are in the original.) An addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid in the form of fine ground South Carolina or Florida soft phosphate, &c., will in many instances not only improve their general fitness as complete manure, but quite frequently permit a material reduction in the amount of barn-yard manure ordinarily considered sufficient to secure satisfactory results.'

'Average composition of seventy-five samples of barn-yard manure :—

	Per cent.	Lbs. per ton.
Moisture	67·00	1,340·0
Nitrogen	0·52	10·4
Potassium Oxide	0·56	11·2
Phosphoric Acid	0·39	7·8

'The average barn-yard manure contains, it will be noticed from the above statement, a larger percentage of nitrogen, as compared with its potash and phosphoric acid than is generally considered economical. An addition of from thirty to forty pounds of muriate of potash, and of one hundred pounds of fine ground natural phosphate (soft Florida or South Carolina floats) per ton of barn-yard manure would greatly increase its value as an efficient and economical general fertilizer.'

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous. No better application can be made of the wood ashes produced in the farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps, by a judicious course of crop rotation. For more than a century agricultural chemists have discussed the question as to whether free atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosæ, such as beans, pease, lentils, vetches, clovers, alfalfa, serradella, &c. Even the great English agriculturists, Sir J. B. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert, at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891.

Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says : 'Lupines require so little manure that they, in fact, replace it ; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land.'

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without results up to the present hour.

Professor König, of Münster, gives the following summary of Schultz's experience :—

'Schultz acquired the farm Lupitz in the year 1855 ; its soil consisted of a poor, cold diluvial sand ; the profit in working it was very small. Lupines yielded, indeed, as a fodder tolerable results, but when used as green manuring for rye and oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay ; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total result was not satisfactory.

'Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine "sick." Schultz made his first trial on this field, manuring it with 300 pounds kainite per morgen (1 Prussian morgen = 0·631 acre) ; the sickness was at once cured, and for twenty-five years afterwards Schultz has grown lupines on this ground without interruption, always with the application of 300 pounds kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, 300 pounds kainite were applied here and ploughed in the fall, the ground was cured, although an application of phosphates had not produced the desired results.

'The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results according to the nature of the crops which preceded the grain. For instance, while grain sowed after lupines and manured with potash and phosphates yielded very good and remunerative harvests, these were not to be obtained if grain was grown after grain or after potatoes- This behaviour of these crops was explained by Schultz in this way : that lupines as deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops ; that, on the other hand, the application of potash and phosphates to grain, after a preceding grain crop, is without effect, for the reason that the latter had consumed the stock of nitrogen. Grain crops always reduce this stock ; never increse it. Schultz has given the name "nitrogen collectors" to the lupines and similar plants, while grains are called "nitrogen consumers." His system of rotation is therefore the following :—Sow first nitrogen collectors (lupines, pease, beans, vetches, clover, lucerne, serradella, &c.) or, as they have been called, renovating crops, and give them 300 lbs. kainite per morgen, with perhaps an addition 20 lbs. phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 lbs. kainite and 20 lbs. phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the

purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element.'

The foregoing description is taken from Professor Konig's 'Stickstoff Vorrath,' published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel, and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work :—

1. 'Pease, alfalfa, serradella, lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

2. 'There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.

3. 'That there is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.

4. 'The cereals with which the experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.

5. 'In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro-organisms or their spores were floating in the air and were deposited in the pots in which the plants grew.

6. 'As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.

7. 'In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where they were no root tubercles; it was especially large with oat plants, and largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.

'Practical inferences:—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, pease, beans, vetches and cow pease as renovating crops, and enforces the importance of these crops to restore fertility to exhausted soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care to collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder.'

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in appropriating and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebigs teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses in fertilizing material which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn-yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric acid and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be tn the highest degree imperfect. At Berlin it has been proved, that of the nitrogen contained in its sewage, at the very most only13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a source of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to the sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

MOSS MANURE.

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also practised in Congleton, Cheshire, England. In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs. It, of course, at once recalls the dry earth system, regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purpose in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss litter will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is valueless from an agricultural point of view, but this is not the case with moss litter, which as analyses show, often contains as much nitrogen as ordinary barn-yard manure. Numerous analyses have been made of moss litter manure as produced in Germany, aud its average contents from seven different towns may here be stated.

	per cent.	lbs. per ton.		Value per ton.
Nitrogen	0·664	13·28	at 13c.	$1 72
Phosphoric acid	0·350	7·00	5	0 35
Potash	0·285	5·70	5¼	0 30
Water	83·00			$2 37

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds several feet in thickness lying above the peat. The following tests have been made in the Inland Revenue Laboratory of moss litter from various localities in the Dominion :—

—	Moisture.	Ash.	Nitrogen.
	per cent.	per cent.	per cent.
Moss Litter, Berwick, N.S	14.40	1.16	1.26
Black Muck, "	13·30	3·68	1·58
Moss from Great Village, N.S.	63·44	3·46	0·63
Sphagnum moss from Shippegan, N.B.	12·45	1·55	0·55
Light coloured moss litter from Lincoln Parish, N.B.	11·55	1·40	1·79
Dark coloured sample from the foregoing locality	10·95	0·80	1·06
Moss litter from Musquash, N.B., upper layer	11·50	0·95	0·82
Moss litter from same locality, lower layer	12·50	0·90	0·72
Peat from St. Bridget, Province of Quebec.	13·30	2·50	1·48
Peat from St. Hubert, Quebec.	12·35	2·68	1·84
Light coloured moss litter from Caledonia Springs	10·00	1·60	2·95
Dark coloured moss litter from same locality	11·60	2·70	2·26
Peat from the same locality	10·95	3·90	2·94
Surface moss from the Mer Bleu at Eastman's	10·85	2 80	0·71
Surface moss from the Mer Bleu at Baldwin's Farm	7·90	2·66	1·47
Surface moss from the Mer Bleu at Baldwin's Farm, 18 inches deep.	27·90	1·72	1·64
Peat from Mer Bleu at McFadden's Farm, wide ditch, Navan.	22·60	4·40	2·21
Peat from Mer Bleu, McFadden's Farm, narrow ditch, Navan	9·40	6·62	2·80
Peat from near Stratford, Ont.	16·80	9·10	1·91
Hypnum moss from near Stratford, Ont.	8·75	9·72	2·01
Moss litter from bog in Welland County, Ont.	3·85	4·70	1·51
Peat lying underneath the foregoing.	5·30	4·85	1·41
Peat from same locality, lying 4½ feet below surface	3·25	41·25	1·52
Peat from Dobson's bog near Beaverton, Ont.	18·42	9·04	1·89

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and it is now being produced in Welland County, Ontario. From the latter locality I was supplied with several bales of the moss litter for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reports that 100 lbs. of moss litter were sufficient for drying 800 lbs. of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in my office without attracting notice and indeed it was quite devoid of odour. Its analyses gave the following results :

	p.c.	lbs. pr. ton.		Value per ton.
Nitrogen	1·31	26·2	at 13c.	$3 41
Phosphoric acid	0·90	18·0	" 5	0 90
Potash	0·14	2·8	" 5¼	0 15
Water	65.47			$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about $2 per ton ; with 67 per cent, water as in the case of the average given above by Dr. Gossmann, the value is nearly $2.25. Therefore, much better results might be expected agriculturally from a " moss manure " of the composition just described.

Moss litter might also be applied with great advantage in public urinals. When a sample of it was supersaturated with urine and dried, and this process repeated several times, no offensive odours were developed and the product was found on analysis to contain 12·41 per cent of nitrogen which is equal to a valuation of $32.26 per ton.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great benefit on agriculture.

APPENDIX N.

BULLETIN No. 76.—CANNED SALMON.

OTTAWA, July 2, 1901.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—On March 13, 1900, I addressed a report to the Commissioner on the subject of canned goods, which was not published at the time. I would respectfully suggest that its contents, repeated in this report, should now be made public, and at the same time the particulars given concerning a collection of samples of canned salmon since made.

In December, 1899, a circular was, with the Commissioner's approval, issued to almost all the physicians of the Dominion, accompanied by a schedule, in which these gentlemen were requested to state their experience as regards the use of canned goods. The circular and schedule in question are here transcribed :—

DEPARTMENT OF INLAND REVENUE,
OTTAWA, November 18, 1899.

DEAR SIR,—The attention of this department has been called to the frequency with which illness, attributed to the use of canned or tinned foods, is noted in the various daily and weekly newspapers of Canada.

The use of such foods is on the increase, and it is very desirable that the facts as to this matter should be known so that necessary steps may be taken to safeguard the health of consumers.

To this end copies of this circular and schedule are being sent to the medical men of Canada. Will you kindly give them your best attention, and make the returns as carefully as your time will permit, so that the statistics obtained may be full and satisfactory. I shall be much obliged by your returning the schedule not later than the end of the present year, using the accompanying envelope so as to avoid out-lay for postage.

Yours truly,

E. MIALL,
Commissioner.

SCHEDULE.

To Dr. .....
.....

1. Have any cases of illness, apparently attributable to the uses of tinned foods, come under your notice within recent years?

.....

2. Please state the number of such cases, and the period of your observation.

..... years.

3. How many have terminated fatally?

.....

4. Have you judged the symptoms to point to metallic or to ptomaine poisoning?

.....

5. If the latter, was the defect owing to imperfect sealing of the tins, or to slight change or decomposition in the contents on account of age?

.....

6. Have you any suggestions to make with a view to bettering existing conditions as regard tinned foodstuffs?

(Signature).....

Date.....

.....

The number of circulars and schedules sent out to the medical men of the different provinces of the Dominion was 4,348. Of these 263 were returned from the Dead Letter office as not called for, &c. To the latter number must be added thirty schedules returned blank, owing to the death or removal of the parties to whom they were addressed, or for other reasons, and two from the United States. The total number received of schedules which were properly filled up was 1,313. Adding these to the 295 just mentioned, and deducting them from the total number of circulars issued, it appears that 2,740 of the latter were sent out to which no answer of any kind was returned.

The principal question in the schedule which was answered either affirmatively or negatively was as follows: 'Have any cases of illness, apparently attributable to the use of tinned foods, come under your notice within recent years?' Classified according to the answers given to this question and by provinces, the 1,313 schedules above mentioned as having been filled up, show as follows :—

From	'Yes.'	'No.'	Total.
Prince Edward Island	5	13	18
Nova Scotia	27	77	104
New Brunswick	10	74	84
Quebec	66	322	388
Ontario	112	466	578
Manitoba	15	38	53
North-west Territories	9	9	18
British Columbia	10	60	70
	254	1,059	1,313

Of the total number of replies received, 19·3 per cent were therefore in the affirmative.

With reference to the negative replies, it has to be reported that the great majority of the physicians give these without comment. Some add remarks indicating scepticism as regards the prevalence of the cases of illness in question, and others state that nothing of the kind has come under their notice, although canned goods are very generally used in their districts. On the other hand, many evidently believe in the occurrence of such cases outside of their own experience, because they account for the absence of cases by the fact that tinned foods are not generally used in their neighbourhood, or that they discourage their use, and a great many offer suggestions (in response to query No. 6) as to the precautions to be used in the packing, storing and use of such articles. Among these suggestions, the following may be mentioned :—

1. The factories and the foodstuffs to be canned should be subject to inspection so as to ensure cleanliness in the former and good condition of the latter. The use of muriate of tin, chloride of zinc or acid should not be permitted in soldering. After sealing, the tins should be inspected.

2. Imported canned goods should also be subject to inspection.

3. Vessels of glass or earthenware should be used instead of tins or cans.

4. The date of filling and the name of the factory and its proprietor should be stamped on the tin itself.

5. Printed warning should be given on the label of each tin against allowing any of the contents to remain in it after opening and against using the contents if it has any unusual taste or smell, or the can shows any other indications of decomposition. These indications should be described on the label. The purchasers should also be advised to have the contents used up within 24 hours after opening.

6. The sale of canned goods should be prohibited after a certain lapse of time from the date of their manufacture. The periods suggested vary from six months to two years.

7. Canned goods should be kept in cold storage and never stored on grocer's shelves or exposed to the sun's rays or any high temperature. Such treatment of canned goods should be prohibited by law.

It is necessary to note that, among these negative answers, there are to be found very decided statements that the writer has never met with any cases of illness from the use of canned goods during a very long period of practice. There are also warnings against embarrassing the canned goods manufacturers with foolish restrictions, and remarks to the effect that the industry itself is of the greatest importance to the country, and an immense boon and advantage to the consumer. The canning system is said on the whole to be excellent, and to be constantly improving.

Referring now to the affirmative replies, it must be said that the figures and details which they contain do not lend themselves to exact classification. In stating the number of cases it is often done indefinitely, and sometimes the words, 'several' and 'a few' are used. Quite frequently no number at all is stated, no notes or record having been kept. The number of cases actually given amounts to 970 for the whole Dominion. The 'period of observation' sometimes means the whole time during which the physician has been practising, and in many other cases it extends back only a year or two. The average period I find to be seven years. The number of cases of disease apparently attributable to the use of tinned goods would therefore average about 138 per annum in the whole of Canada.

The total number of cases which terminated fatally amounted to 15 in the above mentioned average period.

In reply to query No. 4, the answers are also indefinite, but interpreting them reasonably, about 70 p.c. of the cases are attributed to ptomaine and 30 p.c. to metallic poisoning. As to the cause of the poisoning a great many of the medical men are candid enough to say that they dont know. On the other hand numerous opinions have been expressed and among the causes to which the illnesses have been attributed the following are mentioned in the order of frequency :—I. The contents of the tin are said to have been too old. II. The contents were exposed too much to air after opening, and without being transferred to another vessel. III. Imperfect exclusion of air previous to opening. IV. Unsound character or inferior quality when originally packed.

In response to query No. 6, the suggestions made are of the same nature as recorded above in connection with the negative answers, and the following are given in addition :—

8. Screws should be used in securing the boxes in which the tins are packed as ordinary nails sometimes happen to be driven through the tins causing access of air.

9. Vessels of porcelain or 'fibre' are suggested as substitutes for tin plate, also wood with an impervious coating.

As regards the conclusions which might be drawn from the inquiry, there appeared to be a unanimity of opinion, among the majority of the physicians who made returns, that the time of filling (month and year) and name of the manufacturer or canning factory should be stamped on the tins, and that this should be secured by legal enactment.

A few months after the foregoing report was made some statements appeared in a Canadian newspaper to the effect that canned salmon of bad quality was not unfrequently offered for sale in our markets. The attention of the department was specially called to these statements, which were in the form of editorial articles, and in consequence a collection of samples of canned salmon was ordered to be made in June of last year, and submitted to the district analysts. The subjoined tabular statement shows

the results of their examination. In all 100 samples were collected over a wide extent of country and in the following places:—

	No. of Samples.		No. of Samples.
Halifax, N.S.	8	Ottawa	10
St. John, N.B	8	Toronto	4
Quebec	4	St. Catharines, Ont	4
Montreal	5	Clinton, Ont.	2
Three Rivers	3	Goderich, Ont	2
Drummondville	2	Hensall, Ont	2
St. Anne de Beaupré	2	Exeter, Ont	2
Richmond, P.Q	3	London, Ont	2
Granby, P.Q	4	Winnipeg, Man	12
Hull, P.Q	2	Vancouver, B.C	11
Farnham, P.Q	2	New Westminster, B.C	1
Aylmer, P.Q	2		
St. Hyacinthe, P.Q	3	Total	100

It will be observed from the table that traces of metallic contamination were found in about one-half the number of samples. These traces do not, however, indicate anything to which exception can be taken, and even in the cases where 0·0009 p. c. and 0·0012 of lead were detected it is doubtful whether such very small quantities are injurious to the consumer. This matter has been discussed in part 8 of Bulletin No. 13, U.S. Department of Agriculture, but no conclusions seem yet to have been reached regarding the limits to be recommended as allowable in cases of metallic contamination. In 1892 the Italian Government amended the food law of that country so that amounts of copper not exceeding 100 millegrammes per kilo. are to be allowed in green preserved vegetables. This means 100 parts per million, while the quantities above mentioned of lead are only 9 and 12 parts per million, respectively.

No addition of preservatives was discovered in any of the samples.

The table also shows that not one of them has been challenged as unsound, unfit for food or calculated to be injurious to the consumer. Only three samples are mentioned as having an objectionable odour, one of these being very bad and two samples are characterized as stale. Thus only 5 per cent at most of the samples collected were found to be in any degree doubtful so far as quality is concerned. On the whole, the examination shows that there is nothing in the canned salmon trade to justify the newspaper articles above referred to.

I beg to recommend the publication of this report.

I have the honour to be, sir,

Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

STATEMENT of the Results of Examining

No. of Sample.	Date of Collection.	Quantity Purchased.	Cost.	Name or Brand.	Name and Address of Vendor.	Name and Address of Packer as shown on Label.
	1900.		$ cts.	*Official Analyst, M. Bowman, Halifax, N.S.*	*Halifax, N.S.*	
16780	June 26..	3 cans..	0 36	'Fresh Fraser River.'	J. P. Buckley, Lower Water St.	.....
16781	" 26..	" ..	0 45	'Victory'	F. Fleming, Pleasant St.	McPherson & Hickey, Vancouver.
16782	" 26..	" ..	0 36	'Drysdale'.....	R. F. Forristall, Birmingham St.	Canoe Pass Canning Co., Fraser River, B.C.
16783	" 26..	" ..	0 45	'Drysdale'.....	V. Grant, Rottenburg St.	" " ..
16784	" 26..	" ..	0 38	'Viceroy'....	R. Urquhart & Son, Spring Garden Rd.	B.C. Canning Co., Victoria
16785	" 26..	" ..	0 45	'Skeena River'.....	W. J. Hopgood, Spring Garden Rd.	Skeena River Packing Co., Victoria, B.C.
16786	" 26..	" ..	0 45	'Laurel'	" " ..	Anglo B. C. Packing Co., Victoria.
16787	" 26..	" .	0 36	'Corn Flower'.....	Crockett & Co.....	" " ..
					St. John, N.B.	
17716	" 19..	" ..	0 36	'Capital'..... ...	W. F. Hatheway, 17 South Wharf.	Victoria Canning Co., B.C.
17717	" 19..	" .	0 36	'Arbutus'.....	Northrup & Co., 23 South Wharf.	" " ..
17718	" 19..	" ..	0 34	'Royal Club'.....	Merritt Bros., Ward St.	B. C. Canning Co ... ...
17719	" 19..	" ..	0 60	'Golden Crown'....	Baird & Peters, 16 Ward St.	W. S. Loggie & Co., Chatham, N.B.
17720	" 20..	" ..	0 30	'Brand E'..	G. S. De Forest & Sons, 9 North Wharf.	West Coast Fishing and Trading Co., B.C.
17721	" 20..	" ..	0 45	Sterling	Bowman & Angevine, 28 Water St.	Lowe Inlet Packing Co., Victoria, B.C.
17722	" 20..	" ..	0 35	'Chieftain'.....	Gilbert Bent & Son, 5 South Wharf.	English Packing Co , B.C.
17723	" 20..	" ..	0 40	'Queen'	G. M. & A. A. Barker, 100 Princess St.	British American Packing Co., B.C.
				Official Analyst, Dr. M. Fiset, Quebec.	*Drummondville, Que.*	
19936	" 22..	" ..	0 36	'Warrior'...	D. Hebert....	Pacific Packing Co .....
19937	" 22..	" ..	0 45	'Laurel Wreath'...	J. N. Turcott.....	Anglo B. C. Packing Co., Ltd.
					Montreal.	
19938	" 22..	" ..	0 45	'Horse Shoe'. .	Jos. Beauchamp, 149 Vitre St.	Richmond Canning Co., Victoria. B.C.
19939	" 22..	" .	0 30	'Ocean'.....	" " ..	Malcolm & Windsor, Steveston, B.C.
					Three Rivers, Que.	
19940	" 25.	" ..	0 38	'Sunflower'.....	Duval & Bellefeuille, 41 Desforges St.	North Coast Packing Co..
19941	" 25..	" ..	0 38	'C' in ◇.....	U. Carignan, 134 Desforges St.	Harlock Packing Co.....
19942	" 25..	" ..	0 38	"	O. Carignan et fils, 148 Desforges St.	Skeena Packing Co. ....

100 samples of Canned Salmon.

Results of Analysis.						Condition of Fish and Colour, &c.	No. of Sample.	Official Analysts Remarks.
Metallic Contamination.				Preservatives.				
Copper.	Lead.	Tin.	Iron.	Borax.	Salicylic Acid.			
.....	None...	.....	.....	.....	None...	Pale in colour but sound; tin bright except a few dark spots.	16780	Unadulterated.
.....	" ...	.....	.....	.....	" ...	Pale in colour but sound; tin very slightly blacken'd	16781	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright with a few dark spots.	16782	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin showed a few dark spots.	16783	"
.....	" ...	.....	.....	.....	" ...	" " ..	16784	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright except slight blacken'g on bottom	16785	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright.....	16786	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin slightly darkened on one side.	16787	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright except a few dark spots.	17716	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin blackened on one side.	17717	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright, no spots.	17718	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright except slight blacken'g near seam	17719	"
.....	" ...	.....	.....	.....	" ...	Fish good; tin bright except a few dark spots.	17720	"
.....	" ...	.....	.....	.....	" ...	Fish good; a very few spots on tin.	17721	"
.....	" ...	.....	.....	.....	" ...	" " ..	17722	"
.....	" ...	.....	.....	.....	" ...	Fish sound but rather soft; Tin slightly blackened on bottom.	17723	"
.....	" ...	None...	Trace ..	.....	" ...	Taste and smell good, colour rather pale, sound and pretty firm.	19936	Genuine.
.....	.....	Present.	Present.	.....	" ...	Taste and smell good, sound and firm, colour very pink.	19937	"
.....	Trace ..	.....	"	.....	" ...	Taste and smell good, sound and firm.	19938	"
.....	.....	Present.	"	.....	" ...	Peculiar smell, very pale in colour, not very well preserved.	19939	"
.....	Traces..	"	"	.....	" ...	Taste and smell good, pale in colour, sound and pretty firm.	19940	"
.....	Non...	None...	"	.....	" ...	Taste, smell and colour good, sound and firm.	19941	"
.....	Trace ..	Present.	"	.....	" ...	" " ..	19942	

1-2 EDWARD VII., A. 1902

STATEMENT of the Results of Examining

No. of Sample.	Date of Collection.	Quantity Purchased.	Cost.	Name or Brand.	Name and Address of Vendor.	Name and Address of Packer as shown on Label.
	1900.		S cts.	*Official Analyst, Dr. M. Fiset, Quebec.*	*Ste. Anne de Beaupré.*	
19943	June 26..	3 tins...	0 45	'Sovereign'	E. Forest & Co., Main St.	Anglo B. C. Packing Co..
19944	" 26..	" ..	0 45	'Eaglé'	Louis Morel, Main St..	Victoria Packing Co.....
					Quebec.	
19945	" 26 .	" ..	0 35	'Tulip'.....	S. P. Brosseau, 320 St. Paul St.	Anglo B. C. Packing Co..
19946	" 26..	" ..	0 45	'Red Cohoe'..... .	L. T. Demers, Champlain Market.	Thos. Earle, Victoria, B.C.
19947	" 26.	" ..	0 39	'Viceroy'	A. Convey, 97 Saint Matelot.	B. C. Canning Co.....
19948	" 26..	" ..	0 45	'Capital'..... . ..	C. Lavoie, 155 Bridge St.	Victoria Canning Co.....
					Richmond, Que.	
19949	" 27..	" ..	0 45	'Queen'	K. McRae, Main St...	British American Packing Co.
19950	" 27..	" ..	0 45	'Queen Charlotte'..	Desmarais Bros., Main St.	B. C. Canning Co.....
19951	" 27..	" ..	0 38	'Blue Jacket'.. ..	Jas. Pilgrim..... ..	English Bay Canning Co..
				Official Analyst, Dr. F. X. Valade, Ottawa.	*Ottawa.*	
20711	" 20.	2 " ..	0 30	'Queen Charlotte'..	C. Moreland, Sparks St	B. C. Canning Co., Victoria, B.C.
20712	" 20..	" ..	0 30	Brand 'E'..	" " ..	West Coast, B.C., Fishing and Trading Co.
20713	" 20..	" ..	0 30	'Clover Leaf'.	Larose & Co., Sussex St	Packed at Lulu Island, B.C.
20714	" 20..	" ..	0 20	'Ocean'.....	G. Marineau, 64 Murray St.	Malcolm & Windsor, Steveston, B.C.
20715	" 21..	" ..	0 24	'Red Clover'.....	J. Boyden & Son, Sussex St.	Anglo B. C. Packing Co., Vancouver.
20716	" 21..	" .	0 25	'Triangle'..	H. Cussans, 115 George St.	B. C. Canning Co., Victoria, B.C.
20717	" 21..	" ..	0 30	'Laurel Wreath'....	Larose & Co., Sussex St	Anglo B. C. Canning Co., Vancouver.
20718	" 21..	" ..	0 25	Brand 'C'..	Kennedy & Co., Wellington St.	Skeena Packing Co., B.C.
20719	" 21..	" ..	0 30	'Lynx'..... . .	Goodall Bros., Wellington St.	Anglo B. C. Packing Co.
20720	" 21..	" ..	0 25	'Corn Flower	A. McKenzie, O'Connor St.	.....

100 Samples of Canned Salmon—*Continued.*

Results of Analysis.						Condition of Fish and Colour, &c.	No. of Sample.	Official Analyst's Remarks.
Metallic Contamination.				Preservatives.				
Copper.	Lead.	Tin.	Iron.	Borax.	Salicylic Acid.			
.....	Trace...	Present.	Present.	.....	None...	Taste, smell and colour good, sound and firm.	19943	Genuine.
.....	" ..	" .	" .	.. ..	" ...	" " ..	19944	"
.....	" ..	" .	" .	.....	" ...	Taste and smell good, colour pale, sound and pretty firm.	19945	"
.....	" ..	" .	" .	.....	" ...	Taste, smell and colour good, sound and firm.	19946	"
.....	=0·0009 p. c.	" .	" .	.....	" ...	" " ..	19947	Contaminated with lead.
..... .	.....	" .	" .	.....	" ...	" " ..	19948	Genuine.
....	Trace ..	" .	" .	.....	" ...	" " ..	19949	Doubtful.
.....	.....	" .	" .	.....	" ...	" " ..	19950	Genuine.
.....	=0·0012 p. c.	" .	" .	.....	" ...	Taste and smell only fair, colour rather pale, pretty firm.	19951	Contaminated with lead.
None.	None.	None.	.....	None.	None.	Flesh firm, good colour, odour and taste ; tin has a few dark spots.	20711	Good.
"	Doubtful trace.	"	.....	"	"	Flesh rather pale, but good odour and taste ; tin clean.	20712	"
"	None.	"	.....	"	"	Colour, odour and taste very good ; flesh firm ; tin clean.	20713	"
"	"	Faint trace.	.....	"	"	Strong metallic odour when opened, flesh soft and dirty white, most likely been long in the tin, does not taste badly.	20714	Stale, but no bad.
"	"	"	.....	"	"	Flesh gray but firm and sweet ; tin in good condition.	20715	Good.
"	"	None.	.....	"	"	Very fine in colour, odour and taste ; tin very slightly spotted.	20716	Very good.
"	"	Faint trace.	.. ..	"	"	Colour, odour and taste very good ; tin has a few dark spots.	20717	Good.
"	"	None.	.....	"	"	" " ..	20718	"
"	"	"	.....	"	"	" " ..	20719	"
"	"	"	.....	"	"	Colour, odour and taste very good ; tin clean.	20720	"

STATEMENT of the Results of Examining

No. of Sample.	Date of Collection.	Quantity Purchased.	Cost.	Name or Brand.	Name and Address of Vendor.	Name and Address of Packer as shown on Label.
	1900.		$ cts.	*Official Analyst Dr. F. X. Valade, Ottawa*	*Granby, P.Q.*	
19932	June 21..	3 cans.	0 45	'Queen'....	H. Paré.....	British American Packing Co.
19933	" 21..	" ..	0 45	'Queen Charlotte'..	Hade Bros.....	B. C. Canning Co .. ....
19934	" 21..	" ..	0 38	'Sunflower'.....	N. Mitchell.....	North Coast Packing Co.
19935	" 21..	" ..	0 54	'Red Clover'..	D. Hebert, Drummondville.	Anglo, B.C., Packing Co.
				Official Analyst, Dr. W. H. Ellis, Toronto.	*Toronto.*	
20721	" 30..	2 tins...	0 30	"Horseshoe'.	T. Reed, 802 Yonge st.	Richmond Canning Co., Victoria, B.C.
20722	" 30..	" ..	0 25	'Globe'.....	" " ..	Globe Canning Co., Claxton, B.C.
20723	" 30..	" ..	0 25	'Cariboo'.....	M. Moyer & Son, 100 Queen St. W.	Steveston Canning Co., B.C.
20724	" 30..	" ..	0 25	'Flagship'.....	J. A. Johnson, 775 Yonge St.	R. Ward & Co., Victoria, B.C.
					Hull, P.Q.	
20725	July 3..	" ..	0 24	'Faust'.....	J. Bertrand.	Anglo B. C. Packing Co.
20726	" 3..	" ..	0 26	'Red Clover'.. ...	Deschamps & Carriere.	" " ..
					Aylmer, P.Q.	
20727	" 3..	" ..	0 25	'Queen Charlotte'...	S. Lochnan.....	B. C. Canning Co.....
20728	" 3..	" ..	0 30	'Empress'.....	C. Devlin....	Lulu Island Packing Co., Vancouver.
					St. Catharines, Ont.	
20729	June 30..	" ..	0 25	'Viking'.....	Mrs. McLean.....	Clayoquot Fishing and Trading Co., Victoria.
20730	" 30..	" ..	0 25	.. ..	Moore & Pakman.	Lowe Inlet Packing Co., B.C.
20731	" 30..	" ..	0 25	'Viking'.....	" ...	Clayoquot Fishing and Trading Co., Victoria.
20732	" 30..	" ..	0 25	'Victory'.....	A. Wilson.....	McPherson & Hickey, B.C.
					Montreal.	
19928	" 19..	3 " ..	0 30	'Nansen'.....	L. P. Forrest, 1978 St. Catherine St.	B. C. Packing Co., Vancouver.
19929	" 19..	" ..	0 35	'Drysdale'..... ...	S. Cardinal, 2307 Notre Dame St.	Canoe Pass Canning Co., B.C.
					Farnham, P.Q.	
19930	" 19..	" ..	0 30	'White Salmon'....	C. L. Elms, Main St.	B. C. Packing Co. New Westminster.
19931	" 19..	" ..	0 35	'S. & S'..	" " ..	Imperial Canning Co. Victoria.

SESSIONAL PAPER No. 14

100 Samples of Canned Salmon—*Continued.*

Results of Analysis.						Condition of Fish and Colour, &c.	No. of Sample.	Official Analyst's Remarks.
Metallic Contamination.				Preservatives.				
Copper.	Lead.	Tin.	Iron.	Borax.	Salicylic Acid.			
None.	None.	None.		None.	None.	In good condition, flesh firm; tin slightly brown in patches.	19932	Good.
"	"	Faint trace.		"	"	Good in colour, odour and taste, flesh firm; tin clean.	19933	"
"	Doubtful trace.	"		"	"	Flesh soft and gray, but odour and taste good; tin clean.	19934	"
"	"	None.		"	"	Flesh firm, good colour odour and taste; tin a little corroded.	19935	"
None.				None.		Red, firm, and in good condition.	20721	Unadulterated
"				"		" "	20722	"
"				"		" "	20723	"
Slight trace of metallic contamination.				"		" "	20724	"
None.				"		" "	20725	"
"				"		" "	20726	"
"				"		" "	20727	"
Slight trace of metallic contamination.				"		" "	20728	"
Trace of metallic contamination.				"		Red, soft, good condition.	20729	"
"				"		Red, firm, good condition.	20730	"
"				"		" "	20731	"
Slight trace of metallic contamination.				"		Light red, soft, good condition.	20732	"
None.				"		Yellowish white, firm, and in good condition.	19928	"
"				"		Red, firm, good condition.	19929	"
	Traces.	Traces.			None.	Yellowish white, firm, and in good condition.	19930	"
	"	"			"	Red, firm, good condition.	19931	"

STATEMENT of the Results of Examining

No. of Sample.	Date of Collection.	Quantity Purchased.	Cost.	Name or Brand.	Name and Address of Vendor.	Name and Address of Packer as shown on Label.
	1900.		$ cts.	*Official Analyst, F. T. Harrison, London.*	*Clinton, Ont.*	
19361	June 19..	2 tins..	0 25	'Royal Club'.....	Harrison Wiltse	B C. Canning Co., Victoria
19362	" 19..	" ..	0 25	'O, Wee, Kay, No'.	F. Melville.....	" " ..
					Goderich, Ont.	
19363	" 19..	" ..	0 25	....	T. G. Tipling.....	Lowe Inlet Pkg. Co., B.C.
19364	" 19..	" ..	0 25	'Queen Charlotte'..	O. C. Whitely.....	B. C. Canning Co.....
					Hensal, Ont.	
19365	" 20..	" ..	0 25	'Golden Net'.....	E. Rannie.....	" " .....
19366	" 20..	" ..	0 25	'Viceroy'.	"	" " .....
					Exeter, Ont.	
19367	" 20..	" ..	0 25	'Triangle'.....	Farmer Bros.....	Windsor Canning Co., B.C
19368	" 20..	" ..	0 30	'Clover Leaf'... ..	J. A. Sheward.....	Packed at Lulu Island, B. C.
					London, Ont.	
19369	" 21..	" ..	0 20	'Favorite'.....	Turville & Nicholas, 125 Dundas St.	Namu Cannery, B.C.....
19370	" 21..	" ..	0 20	'Southern Cross'....	Mrs. George, 58 Dundas St.	....
					St. Hyacinthe, P.Q.	
19924	" 18 .	3 " ..	0 45	'Clover Leaf'.....	S. Bourgeois & Co.....	Packed at Lulu Island, B. C.
19925	" 18..	" ..	0 30	L.C.F.C. in circle...	O. Brodeur.....	....
19926	" 18..	" ..	0 36	'Lynx'.....	T. G. Bourgeois.....	Anglo British Pkg. Co., B. C.
					Montreal.	
19927	" 19..	" ..	0 36	'Excelsior'.....	L. P. Forrest, 1978 St. Catherine.	Excelsior Pkg. Co., Ladner's Landing, B.C.
				Official Analyst, E. B. Kenrick, Winnipeg.	*Winnipeg.*	
17245	" 20..	3 cans..	0 25	'Ocean'	Kenneth Mackenzie & Co.	Malcolm & Windsor, Steveston, B.C.
17246	" 20..	" ..	0 35	'Neptune'.....	" " ..	Skeena River Pkg. Co., Victoria, B.C.
17247	" 20..	" ..	0 40	'Capital'.....	" " ..	Victoria Canning Co.....
17248	" 20.	" ..	0 35	'Red Rose'..... . .	" " ..	R. Ward & Co., Victoria, B.C.
17249	" 20..	" ..	0 40	'Maple Leaf'..... .	" " ..	Delta Canning Co., Victoria, B.C.
17250	" 20..	" ..	0 35	'Snow Shoe'.....	Codville & Co.....	R. Ward & Co., Victoria B.C.

100 Samples of Canned Salmon—*Continued.*

Results of Analysis.						Condition of Fish and Colour, &c.	No. of Sample.	Official Analyst's Remarks.
Metallic Contamination.				Preservatives.				
Copper.	Lead.	Tin.	Iron.	Borax.	Salicylic Acid.			
.....	None.	None.	Trace.	None.	None.	Odour good, flesh good colour and firm; can not corroded.	19361	Not adulterated.
.....	"	Trace.	"	"	"	Odour good, flesh rather light, firm and apparently in good condition; can not corroded.	19362	"
.....	"	"	"	"	"	Odour good, flesh good colour and firm, not corroded.	19363	"
.....	"	"	"	"	"	Odour good, flesh rather light colour, fairly firm; can not corroded.	19364	"
.....	"	None.	"	"	"	Odour good, colour normal, flesh firm; can not corroded.	19365	"
.....	"	"	"	"	"	Odour good, flesh good colour and firm; can not corroded.	19366	"
Acciden	tally lost for these	portion tests.	reserved	"	"	Odour good, flesh very light coloured and rather soft, can not corroded.	19367	"
.....	None.	Slight trace.	None.	"	"	Odour good, colour good, flesh firm; can not corroded.	19368	"
.....	"	None.	"	"	"	Odour good, flesh rather light and not very firm.	19369	"
.....	"	Trace.	"	"	"	Odour good, flesh firm and good colour; can not corroded.	19370	"
.....	"	"	Trace.	"	"	" " ..	19924	"
.....	"	None.	None.	"	"	" " ..	19925	"
.....	Very slight trace.	Trace.	Trace.	"	"	Odour good, flesh rather light, firm and apparently good; can slightly darkened in spots.	19926	"
.....	None.	"	None.	"	"	Odour good, colour good, flesh fairly firm; can not corroded.	19927	"
.....	.....	Traces.	.....	.....	.....	Colour very pale.....	17245	Genuine.
.....	.....	"	.....	.....	.....	Colour pale, bitter taste...	17246	"
.....	.....	"	.....	.....	.....	" " ...	17247	"
.....	.....	"	.....	.....	.....	Colour pale, unpleasant odour.	17248	"
.....	.....	"	.....	.....	.....	Of good colour and generally good quality.	17249	"
.....	.....	"	.....	.....	.....	Contents of tin much broken up and pale in colour, otherwise in good condition.	17250	"

STATEMENT of the Results of Examining

No. of Sample.	Date of Collection.	Quantity Purchased.	Cost.	Name of Brand.	Name and Address of Vendor.	Name and Address of Packer as shown on Label.
	1900.		$ cts.	*Official Analyst, E.B. Kenrick, Winnipeg.*	*Winnipeg.*	
17251	June 20.	3 cans..	0 35	.....	Coeville & Co	Lowe Inlet Pkg. Co., Victoria, B.C.
17252	" 20..	" ..	0 40	'Clover Leaf'.....	"	Packed at Lulu Island, B.C.
17253	" 20..	" ..	0 35	'Blue Jacket' . . .	"	The English Bay Canning Co., Vancouver, B.C.
17254	" 20..	" ..	0 30	'Buffalo'.....	"	Bon Accord Fishery Co., B.C.
17255	" 20..	" ..	0 35	... .	"	Imperial Pkg. Co., Vancouver, B.C.
17256	" 20..	" ..	0 40	'Eagle'.	John Morrin & Co....	Victoria Canning Co., B.C.
				Official Analyst, Dr. C. J. Fagan, B.C.	*Vancouver, B.C.*	
20196	" 20..	2 cans..	0 20	'Fraser River'.....	Welsh & Nightingale..	....
20197	" 20..	" ..	0 25	'Princess'..	C. Uichida..... ...	C. G. Hobson & Co., Vancouver.
20198	" 20..	" ..	0 20	'Moss Rose'..... .	J. Donald & Co... ..	Goodmurphy Dinsmore Pkg. Co., B.C.
20199	" 20..	" ..	0 20	'Fraser River'.....	E. Clayton.....	... .
20200	" 20..	" ..	0 20	'Imperial'..... ...	Edgett & Co	Dunsmuir Island Canning Co., B.C.
21501	" 20..	" ..	0 20	'Signal'	A. H. Keeping..	Pacific Pkg. Co.....
21502	" 20..	" ..	0 20	'Trident'.....	F. Filion.....	....
21503	" 21..	" ..	0 25	'Triangle'...	W. H. Walsh.....	B. C. Canning Co.....
21504	" 21..	" ..	0 25	'Viceroy'	McCracken & Beath...	" " .....
21505	" 21..	" ..	0 25	'Wurzburgs'..	Mrs. Fleming.....	Wurzburg & Co., Vancouver, B.C.
21506	" 21.	" ..	0 20	'Lily'.....	C. Mowat....	Anglo American Canning Co.
21507	" 21..	" ..	0 20	'Golden Net'.....	H. Harvey, New Westminster.	Columbia Pkg. Co.....

100 Samples of Canned Salmon—*Concluded.*

Results of Analysis.						Condition of Fish and Colour, &c.	No. of Sample.	Official Analyst's Remarks.
Metallic Contamination.				Preservatives.				
Copper.	Lead.	Tin.	Iron.	Borax.	Salicylic Acid.			
.....	.....	Traces..	.....	.....	.....	Good colour and quality...	17251	Genuine.
.....	.....	"	.....	.....	.....	" " ...	17252	"
.....	.....	"	.....	.....	.....	Contents of can in finely divided state and of a pale colour.	17253	"
.....	.....	"	.....	.....	.....	Contents of tin rather broken up and of light colour.	17254	"
.....	.....	"	.....	.....	.....	Of good colour and quality.	17255	"
.....	.....	"	.....	.....	.....	Pale in colour and much broken up.	17256	"
None.				.....	.....	Red salmon, sweet smell, in good condition.	20196	
Tin present				.....	.....	" "	20197	
None.				.....	.....	" "	20198	
"				.....	.....	White salmon, no odour but not very fresh.	20199	
"				.....	.....	Red salmon, sweet and fresh.	20200	
"				.....	.....	Red salmon, stale.....	21501	
"				.....	.....	Red salmon, odour very bad, old fish, soft and broken down.	21502	
"				.....	.....	Red salmon, in fair condition, odour slightly stale.	21503	
"				.....	.....	Red salmon, sweet, firm and in good condition.	21504	
"				.....	.....	White salmon trout, condition fair.	21505	
"				.....	.....	Red salmon, sweet, fresh and in good condition.	21506	
"				.....	.....	Red salmon, in good condition.	21507	

APPENDIX O.

BULLETIN No. 77.—EFFERVESCENT SODIUM PHOSPHATE.

OTTAWA, June 15, 1901.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—In December last, in consequence of a recommendation from Mr. A. McGill, B.A., my assistant, a collection was made of samples of Effervescent Sodium Phosphate a medicinal preparation described in the British Pharmacopœia. Sixty-four samples were in all collected and submitted to the district analysts for examination. Their results and opinions, as well as the names of the vendors, are given in the subjoined Table No. I. It will be observed that, in this table, the column which in previous reports has been headed: 'Name and address of manufacturer or furnisher as given by vendor,' has been altered and reads in the table referred to: 'Name and address of manufacturer as shown by label.' This change has been made in consequence of a decision by your predecessor, to whom complaints had been made that, occasionally, some injustice had been suffered by wholesale merchants in consequence of incorrect information supplied by the parties who sold the samples.

Out of the 64 samples analysed only 13, or 20 per cent, have been found to be genuine by the district analysts. The greater number of the adulterated samples have been so characterized, because they do not correspond with the requirements of the British Pharmacopœia.

I subjoin herewith Mr. McGill's report along with Table II. appended to it, and have to recommend the publication of the whole report now submitted.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

TABLE

Results of the Examination of 64 Samples

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer, as shown by Label on Bottles.
1900.			$ cts.	*Official Analyst, M. Bowman, Halifax, N.S.*	
				Kentville, N.S.	
Dec. 26	20021	12 oz...	1 25	R. S. Masters	
				Truro, N.S.	
" 28	20022	12 " ...	1 50	Crowe Bros	Parke, Davis & Co., Walkerville, Ont..
				Halifax, N.S.	
" 29	20023	12 " ...	1 50	G. F. Colwell	
" 29	20024	12 " ...	1 25	Buckley Bros	
" 29	20025	12 " ...	1 50	G. A. Burbridge	J. Wyeth Bros., Philadelphia, U.S.A.
				St. John, N.B.	
" 19	17756	3 bots .	0 75	The Canadian Drug Co., Ltd., 60 Prince William St.	The Toronto Drug Company
" 20	17757	3 " .	1 50	Silas McDiarmid, King St	J. Wyeth Bros.. Philadelphia
" 20	17758	12 oz...	1 20	Geo. A. Moore, 109 Brussel St..	
" 20	17759	3 bots.	0 75	Hazen J. Dick, 144 Charlotte St.	Chandler & Massey, Toronto and Montreal.
" 21	17760	12 oz...	0 75	The Canadian Drug Co., Ltd	
				Official Analyst, Dr. M. Fiset, Quebec.	
				Quebec.	
" 19	19763	2 bots .	1 00	Laroche & Co., Fabrique St	H. K. Wampole & Co., Philadelphia
" 19	19764	2 " .	1 00	W. Brunet & Co., 139 St. Joseph St.	Wyeth Bros., Philadelphia
" 19	19765	2 " .	0 50	V. Giroux, St. Peter St	Lyman, Sons & Co., Montreal
" 20	19766	2 " .	0 78	J. E. Livernois, Fabrique St	Wyeth Bros., Philadelphia
" 20	19767	2 " .	0 70	J. E. Dubé, St. John St	Lyman, Sons & Co., Montreal
				St. Hyacinthe.	
" 27	19768	2 " .	1 00	Eugene St. Jacques, Cascade St..	H. K. Mulford & Co., Philadelphia and Chicago.
				Sherbrooke, P.Q.	
" 28	19769	1 bot...	0 50	E. C. Fraser, Commercial St	H. K. Wampole & Co., Philadelphia
" 28	19770	1 " ..	0 50	" "	H. K. Mulford & Co., Philadelphia and Chicago.
" 28	19771	1 " ..	1 00	W. H. Griffith, 121 Wellington St.	Wyeth Bros., Philadelphia
" 29	19772	¾ lb ...	1 00	J. C. Sutherland, Main St	
Sept. 7	19967	2 bots .	0 50	W. H. Griffith, 121 Wellington St.	

I.

of Effervescent Sodium Phosphate.

Results of Analysis.						No. of Sample.	Remarks by Official Analyst.
Phosphoric Acid (P_2O_5).	Organic Acids, as Tartaric.	Citric Acid.	Soda Bicarb. Originally present.	Soda Bicarb. Undecomposed.	Sugar.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
5·27	50·25	.....	39·21	.....	... .	20021	Below standard in sodium phosphate.
8·02	48·57	.....	35·39	...	. ....	20022	" "
7·85	42·37	.....	41·93	... ..	.....	20023	" "
5·63	51·15	.....	37·59	.....	.... .	20024	" "
5·63	49·68	.....	39·06	. ...	.....	20025	" "
4·12	45·37	.....	46·39	.....	.....	17756	" "
5·36	52·29	.....	36·99	... ..	.....	17757	" "
8·32	42·56	.....	40·80	.....	.....	17758	" "
5·92	44·44	.....	43·72	.....	.... .	17759	" "
4·97	43·31	.....	46·75	.....	.....	17760	" "
8·69	45·00	Present.	50·32	33·02	....	19763	Genuine.
6·01	49·87	" .	49·68	33·08	.....	19764	Somewhat low in sodium phosphate, otherwise good.
1·53	35·06	" .	35·53	24·43	.....	19765	Much below the B. P. standard.
6·14	50·25	" .	50·48	34·93	...	19766	Rather low in sodium phosphate, otherwise good.
3·00	35·25	" .	35·70	20·52	.....	19767	Much below the B. P. standard.
15·85	30·44	" .	29·94	23·29	.....	19768	Very high in sodium phosphate.
9·02	47·10	" .	51·91	25·39	.....	19769	Genuine.
15·70	36·38	" .	28·90	21·67	....	19770	Very high in sodium phosphate.
6·14	50·02	" .	50·10	35·03	.....	19771	Rather low in sodium phosphate, otherwise good.
4·16	46·35	" .	47·40	29·40	.....	19772	Below B. P. standard in sodium phosphate.
2·81	53·55	.....	36·63	... ..	. ...	19967	Adulterated, being greatly below the B. P. standard sodium phosphate.

TABLE

Results of the Examination of 64 Samples of

Date of Collection.	Number of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer, as shown by Label on Bottle.
1900.			$ cts.	*Official Analyst, Dr. F. X. Valade, Ottawa.*	
				Montreal.	
Dec. 14	19753	6 oz....	0 50	H. Lebeau, 466 St. James St.	
" 14	19754	"	0 50	John T. Lyons, 2 Bleury	
" 14	19755	2 bots..	0 50	L. A. Bernard, 1882 St Catherine St.	Lyman, Sons & Co., Montreal
" 17	19756	6 oz....	0 60	J. H. Charron, 1978 Notre Dame St.	
" 18	19757	2 bots..	0 75	Leeming, Miles & Co., St Sulpice St.	Alfred Bishop Co., London, England
" 18	19758	1 bot..	1 00	Kerry Watson & Co., St. Paul St.	
" 18	19759	5 oz....	0 50	T. E. Huot, St. Catherines St.	
" 18	19760	2 bots..	0 75	Parke, Davis & Co., St. Paul St.	Vendors
" 18	19761	" ..	0 83	Davis, Lawrence & Co., St. Antoine St.	Wyeth Bros., Philadelphia
"	19762	" ..	0 70	Evans & Sons, St. Jean Baptiste.	
				Ottawa.	
Sept. 1	20762	8 oz....	0 50	G. Kennedy, Druggist	
				Toronto.	
Dec. 21	20801	8 oz....	0 75	F. W. McLean, 121 Church St.	'Whites,' Queen City Drug Co., Agents.
" 21	20802	"	0 25	J. F. Taylor, 144 Queen E.	Lyman Bros. & Co., Toronto
" 21	20803	"	0 60	R. Robinson, 216 Queen E.	
" 21	20804	"	0 35	G. A. Bingham, 100 Yonge St.	H. K. Wampole & Co., Philadelphia
" 21	20805	"	0 30	G. C. Harbottle, 135 King W.	
" 21	20806	"	0 50	Burgess, Powell & Co., Yonge St.	Wyeth Bros., Philadelphia
				Peterborough.	
" 22	20807	"	1 00	Ormond & Walsh, Druggist	H. K. Mulford & Co., Philadelphia
" 22	20808	"	1 00	W. Madill, Druggist	Wyeth Bros., Philadelphia
" 22	20809	16 oz....	0 80	H. H. Ednison, Druggist	
" 22	20810	10 oz....	0 50	J. Nugent, Druggist	
Sept. 6	20777	12 oz....	1 00	J. D. Tully, Druggist	Wyeth Bros., Philadelphia.
				Official Analyst, F. T. Harrison, London, Ont.	
				Stratford, Ont.	
Dec. 18	19424	12 oz...	1 00	E. C. Nasmyth	Parke, Davis & Co
" 18	19425	12 " ...	1 00	H. W. Thomson	W. H. Allen, Windsor, Ont.
				London, Ont.	
" 18	19426	12 " ...	1 00	Cairncross & Lawrence, 216 Dundas St.	
" 18	19427	12 " ...	0 80	C. McCallum & Co., cor. Richmond St.	

—*Continued.*

Effervescent Sodium Phosphate—*Continued.*

Results of Analysis.						Number of Sample.	Remarks by Official Analyst.
Phosphoric Acid (P_2O_5.)	Organic Acids, as Tartaric.	Citric Acid.	Soda Bicarb. Originally present.	Soda Bicarb. Undecomposed.	Sugar.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	
4·80	43·86	Present.	49·13	.....	.....	19753	Below standard in phosphates and carelessly compounded.
5·65	43·48	"	48·70	.....	.....	19754	Not up to standard in phosphates and carelessly compounded.
1·50	42·82	"	47·96	.....	.....	19755	Adulterated, being much too low in phosphates.
4·50	38·24	"	42·83	.....	.....	19756	Adulterated, being low in phosphates.
4·37	40·86	"	45·77	.....	.....	19757	Below standard, being low in phosphates. Sample carelessly compounded.
7·20	40·49	"	45·38	.....	.....	19758	Genuine.
2·50	36·37	"	40·73	.....	.....	19759	Adulterated. Much too low in phosphates.
9·20	41·79	"	48·71	.....	.....	19760	Good.
5·65	38·99	"	43·67	.....	.....	19761	Below standard. Sample carelessly compounded.
9·30	40·31	"	45·15	.....	.....	19762	Genuine, but carelessly compounded.
3·98	28·31	12·97	45·35	.....	.....	20762	Good
4·86	38·85	Present.	.....	27·29	.....	20801	Adulterated.
2·83	35·35	"	.....	22·13	.....	20802	"
9·73	50·80	"	.....	30·53	.....	20803	Unadulterated.
9·38	51·76	"	.....	27·56	.....	20804	"
5·17	52·36	"	.....	34·07	.....	20805	Adulterated.
6·10	57·25	"	.....	33·78	.....	20806	"
17·66	12·49	"	.....	24·33	.....	20807	Contains an excess of phosphoric acid, therefore adulterated.
6·45	24·24	"	.....	35·69	.....	20808	Adulterated.
8·15	55·53	"	.....	15·93	.....	20809	"
5·07	46·26	"	.....	32·73	.....	20810	"
6·14	48·65	"	.....	36·85	.....	20777	Not genuine.
9·72	47·96	Present.	50·97	.....	.....	19424	Genuine.
36·36	None.	None ..	40·20	.....	.....	19425	Adulterated, not being made according to the B. P.
10·36	46·07	Present.	49·20	.....	.....	19426	Genuine.
5·12	42·10	" ..	44·60	.....	.....	19427	Adulterated.

1-2 EDWARD VII., A. 1902

TABLE

Results of the Examination of 64 Samples

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Name and Address of Vendor.	Name and Address of Manufacturer as shown by Label on Bottles.
1900.			$ cts.	*Windsor, Ont.*	
Dec. 19	19429	12 „	0 60	A. Wilkinson	Toronto Drug Co.
				London, Ont.	
„ 20	19430	12 „	0 60	C. Symmonds, 468 Dundas St	
„ 20	19431	12 „	0 40	W. E. Saunders	
„ 20	19432	12 „	0 60	N. J. McDermid, Dundas St	
„ 20	19433	12 „	0 60	J. Callard, Richmond St	
Sept. 7	19389	2 bots	0 40	C. McCallum, druggist	
				Official Analyst, E. B. Kenrick, Winnipeg.	
				Ottawa.	
Dec. 10	20793	8 oz	0 50	J. J. Allen, Bank St	Toronto Drug Co
„ 10	20794	10 „	0 35	G. Watson, Bank St	
„ 10	20795	4 „	0 50	Kirby Bros	
„ 10	20796	8 „	0 40	J. J. Allen, Bank St	
„ 10	20797	6 „	0 45	S. J. Stevenson, Elgin St	
„ 10	20798	8 „	0 75	A. E. Brethour, Bank St	
„ 10	20799	8 „	0 40	Skinner & Co., Wellington St	
„ 10	20800	5 „	0 50	J. J. Allen, Bank St	Wyeth Bros., Philadelphia
				Winnipeg.	
Oct. 1	17271	1 bot	1 00	W. J. Mitchell	
				Official Analyst, Dr. C. J. Fagan, Victoria, B.C.	
				Vancouver, B.C.	
„ 26	21524	1 lb	0 75	J. K. Seymour	
1901.				*Victoria, B.C.*	
Jan. 22	21545	3 bots	1 50	Davis Bros.	

I—*Continued.*

of Effervescent Sodium Phosphate—*Concluded.*

Results of Analysis.						No. of Sample.	Remarks by Official Analyst.
Phosphoric Acid (P_2O_5).	Organic Acid, as Tartaric.	Citric Acid.	Soda Bicarb.		Sugar.		
			Originally present.	Udecomposed.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
5·25	41·65	" ..	43·20	.....	.....	19429	Adulterated.
9·34	44·40	" ..	48·60	. ...	.....	19430	Genuine.
5·50	41·58	" ..	43·20	.....	.....	19431	Adulterated.
6·14	45·13	" ..	48·3	.....	.....	19432	"
4·22	42·61	" ..	44·80	.. ..	.....	19433	"
3·56	44·50	" ..	....	....	12·14	19389	Not made according to B. P. and is therefore adulterated.
4·17	35·72	9·89	47 03	.....	7·42	20793	Not in accordance with formula of B. P.
3·13	38·87	10·58	50·14	.....	7·29	20794	" "
10 05	27·40	18·88	50·54	.. ...	.....	20795	Genuine.
.....	18·71	13·08	37·14	.. .	11·69	20796	Adulterated. Contains magnesium sulphate in the place of sodium phosphate.
10·71	24·60	16·54	42·85	.....	....	20797	Genuine.
9·41	23·32	20·12	44·40	.....	....	20798	"
2·22	19·52	14·64	35·43	....	29·41	20799	Adulterated.
4·83	14·69	33·30	49·97	.. .	.....	20800	Not in accordance with the formula of the B. P.
9·67	41·64	.....	30·01	. ...	.. ...	17271	Has lost about 36 per cent of its carbon dioxide through keeping.
25·94	None.	..... .	.....	....	.....	21524	A phosphate of soda.
5·56	32·25	Present.	.....	28·56	... .	21545	Effervescing phosphate of soda.

LABORATORY OF THE INLAND REVENUE DEPARTMENT,
OTTAWA, June 1, 1901.

THOS. MACFARLANE, Esq., F.R.S.C.,
Chief Analyst.

SIR,—On November 16 last, I submitted to you a preliminary report upon a few samples of Effervescing Phosphate of Soda, and two somewhat similar, but proprietary, articles, viz.: Abbey's Effervescent Salt and Eno's Fruit Salt. On account of the large differences found between *Sodii Phosphas Effervescens* as occurring on the market, and as defined by the British Pharmacopœia, I recommended that a considerable number of samples should be subjected to examination, and I have now the honour to furnish herewith a report upon the whole number (64) analysed.

I have the honour to be, sir,
Your obedient servant,

A. McGILL.

Sodii Phosphas Effervescens, or Effervescent Phosphate of Soda.

The British Pharmacopœia prescribes the following formula and mode of preparation for this article :—

Sodium phosphate, crystals	50 parts.
" bicarbonate (powder)	50 "
Tartaric acid	27 "
Citric acid	18 "
	145 "

The crystals of sodium phosphate are directed to be dried to loss of 60 per cent of their weight. Since this salt contains 60·3 per cent of water of crystallization, this means the practical dehydration of it. The bicarbonate of soda and the tartaric acid are normally anhydrous. The citric acid contains one molecule of water, = 8·7 per cent of its weight. Calculated to dry materials the quantities named above become as follows :—

50	parts	cryst. sod. phos. =	20	pts.	anhydrous.
50	"	bicarb. soda =	50	"	"
27	"	tartaric acid =	27	"	"
18	"	citric acid =	16·4	"	"
145	"		113·4	"	"

After mixing the ingredients, the mixture is directed to be further dried so as to weigh about 100 parts. Assuming this further loss to consist solely of carbonic acid gas, resulting from the conversion of bicarbonate of soda into mono-carbonate, the final product should consist of :—

Anhydrous sodium phosphate	20 per cent.
Bicarbonate of soda	16 "
Mono-carbonate of soda	22 "
Tartaric acid	27 "
Anhydrous citric acid	16 "
	100

Corresponding to :—

	P. C. organic acids.		Na_2O		P_2O_5	CO_2		H_2O
HNa_2PO_4	20		= 8·73	+	10·00	..	+	1·27
$HNaCO_3$	15		= 5·54		.....	+ 7·90	+	1·56
Na_2CO_3	22		= 12·87		.....	+ 9·13	+	....
$H_2C_4H_4O_6$	27	43	.....		.....	... .		....
$C_3H_4OH(CO_2H)_3$	16							
	100	43	27 14		10·00	17·03		2·83

Analysis should therefore give :

Total organic acids (as tartaric acid)	43·0	per cent.
Phosphoric acid (as P_2O_5)	10·0	"
Soda (as Na_2O)	27·14	"
Carbonic acid gas (CO_2)	17·03	"
Water (H_2O)	2·83	"
	100·00	"

It is not, however, conceivable that the process of drying the mixture brings about no further chemical changes than are here supposed. On the contrary, it is probable that loss of carbonic acid is, to some extent, brought about by interaction between the organic acids and the bicarbonate of soda, thus forming sodium citrate and tartrate. It is further certain that more or less alteration in composition must result from the separation of the product by sieves into granules of ' uniform and convenient size,' as directed by the pharmacopœia. Besides this, it is inevitable that a gradual reaction should go on between the free acids and the carbonate of soda, during the time that the article is kept in stock. Most of the samples found on the market are very carefully put up by the manufacturers, in order to prevent, as much as possible, deterioration of the kind just referred to ; but absolute prevention of it is probably impossible.

This preparation is evidently intended as a pleasant means of administering sodium phosphate, and it occurs for the first time in the British Pharmacopœia of 1898. It is not mentioned in the United States Pharmacopœia of 1890. The most important component of the effervescent phosphate is therefore the contained phosphate of soda. In proportion as weight is lost through interaction of free organic acid with bicarbonate of soda, the percentage weight of phosphate of soda will increase. As I have already shown, a freshly prepared sample of *sodii phosphas effervescens* should contain 10 per cent of its weight of P_2O_5. On keeping such a sample sufficiently long for the whole of the bicarbonate to have reacted with the organic acids (which are in slight excess of the weight required to decompose the whole of the bicarbonate :—

$$H_2C_4H_4O_6 : 2\,HNaCO_3 :: 150 : 168 = 27 : 30{\cdot}2$$
$$H_3C_6H_5O_7 : 3\,HNaCO_3 :: 192 : 252 = 16 : 21{\cdot}0$$
$$= 43 : 51{\cdot}2$$

the article will have lost 17 per cent of its original weight, and the phosphoric acid will now constitute more than 12 per cent, by weight of it. Hence it is reasonable to demand that commercial samples of effervescent phosphate of soda shall contain phosphoric acid corresponding approximately to at least 10 per cent of P_2O_5. Of the 64 samples analysed, three—viz. : 19,425, 20,796 and 21,524 are not effervescent phosphate. The remaining 61 show the following results, so far as phosphoric acid is concerned :—

Less than	2	per cent P_2O_5	2 samples
"	3	"	4 "
"	4	"	4 "
"	5	"	10 "
"	6	"	13 "
"	7	"	7 "
"	8	"	2 "
"	9	"	4 "
"	10	"	9 "
"	11	"	3 "
"	18	"	3 "
			61

Three samples contain a decided excess of phosphoric acid, viz. :—19,768, 19,770 and 20,807. These are made by an American firm.

Alkaline citrates and tartrates are possessed of purgative properties, and it is not impossible that the citrate and tartrate of soda present in excess, in most of the above samples which show a deficiency of phosphate, may efficiently replace the latter, so far as medicinal properties are concerned. Indeed the dose of Sodii Citro-tartras Effervescens (B.P.) is identical with that prescribed for Sodii Phosphas Effervescens. This preparation contains about 15 per cent of sugar, and the presence of sugar in certain of the samples collected as phosphate of soda, and containing low percentages of phosphate, would seem to imply a confusion of the two preparations. But it should be evident to manufacturers and dealers that the two substances referred to, are quite distinct, and that the purchaser of Sodium phosphate is entitled to receive the article, he asks for, and not a substitute for it. If such samples as 20,793, 20,794 and others, containing sugar, be sold as phosphate of soda, they are adulterated, within the meaning of the Act; while if sold as Effervescent Sodium Citro-tartrate, they are adulterated, as containing phosphate of soda. It is not, however, to be understood that any blame attaches to those manufacturers who have, up to this time, placed on the market an article of effervescing phosphate of soda, containing less (or more) than 10 per cent of $P_2 O_5$. As has already been mentioned, the preparation appears for the first time in the 1898 edition of the British pharmacopœia, and is not contained at all in the United States pharmacopœia. Manufacturing druggists were much in advance of the pharmacopœias and in manufacturing from private formulas they naturally uttered an effervescing phosphate of variable character. Many of the samples, whose analysis is here given, were doubtless in the hands of dealers before the preparation became officinal in 1898. Now, however, that effervescing phosphate of soda has been authoritatively defined it will be required of those who furnish it under its specific name that they should supply the British pharmacopœia article.

In sample 21,524, phosphate of soda has been supplied instead of the effervescent phosphate. Sample 20,796 is made up with Magnesium sulphate, and is consequently adulterated within the meaning of the Act. No. 19,425 contains no citric nor tartaric acid, and consists of acid phosphate with carbonate of soda. Of course this also constitutes adulteration.

In analysis, the estimation of phosphoric acid is effected by any of the recognized methods, and presents no difficulties. The organic acids present are conveniently estimated together by permitting complete reaction to take place, in solution, between the free acids present and the bi-carbonate of soda—with addition of a standard soda solution to exact neutralization. Of course, if the soda is already present in excess, sulphuric acid must be added in excess, carbonic acid boiled off, and the resulting solution carefully neutralized. On evaporating to dryness and charring, the organic acids furnish an equivalent amount of carbonates, from which they may be calculated as tartaric acid without much error. It is necessary to make at least a qualitative test for citric acid, since this has a higher market value than tartaric, and in cases where judged desirable it may be well to estimate the tartaric acid directly as acid potassium salt.

The carbonate of soda existing as such may be estimated by determining the carbonic acid gas liberated by solution in water—with addition of acid, if necessary. This estimation gives an idea of the extent to which deterioration of the article by keeping has taken place.

The original bi-carbonate of soda present is calculated from the same data which furnish the total organic acids. Of course, where considerable deterioration has taken place, the expressing of *original* bi-carbonate of soda, as a percentage on the sample purchased, will give a number much in excess of the fact, and will cause the sum of phosphate soda, organic acids and (original) bi-carbonate soda to add to more than 100. The maximum error that may result from this mode of expressing results may be about 15 to 20 per cent. In the accompanying table II., this is the interpretation to be put upon the numbers larger than 100 in the column headed 'Sum.' Where the number contained in this column is considerably less than 100, it is probably because sugar, or other component, has not been estimated. Where the number is exactly 100, it means

that one of the components has not been directly estimated, but expressed by difference. It is probable that the bi-carbonate of soda is so expressed ; and, in this case, the number given would stand for residual bi-carbonate of soda, and will include sugar, etc., if present. It will be seen that Mr. Bowman has returned his analytical results in this way.

TABLE II.—EFFERVESCING PHOSPHATE OF SODA.

Serial Number.	Departmental Number.	Phosphoric Acid. (P^2O^5.)	Organic Acids—(as Tartaric.)	Bi-carbonate Soda. ($HNaCO^3$.)	Phos. Soda, Calculated. (HNa^2PO^4)	Sum.	Sugar.	Remarks.	Analyst.
1	17756	4·12	45·37	46·39	8·24	100·00		Bi-carbonate soda by difference	Bowman.
2	17757	5·36	52·29	36·99	10·72	100·00		"	"
3	17758	8·42	42·56	40·80	16·64	100·00		"	"
4	17759	5·92	44·44	43·72	11·84	100·00		"	"
5	17760	4·97	43·31	46·75	9·94	100·00		"	"
6	19424	9·72	47·96	50·97	19·44	118·37			Harrison.
7	19425	36·36		40·20					"
8	19426	10·36	46·07	49·20	20·72	115·99			"
9	19427	5·12	42 10	44·60	10·24	98·94			"
10	19428								"
11	19429	5·25	41·65	43·20	10·50	95·35			"
12	19430	9·34	44·40	48·60	18·68	111·68			"
13	19431	5·50	41·58	43·20	11·00	96·78			"
14	19432	6·14	45·13	48·30	12·28	107·71			"
15	19433	4·22	42·61	44·80	8·44	95·85			"
16	19753	4·80	43 86	49 13	9·60	102·59			Valade.
17	19754	5·65	43·48	48·70	11·30	103·48			"
18	19755	1·50	42·82	47 96	3·00	93 78			"
19	19756	4·50	38·24	42·83	9·00	90·07			"
20	19757	4·37	40·86	45·77	8·74	95·37			"
21	19758	7·20	40·49	45·38	14·40	100·27			"
22	19759	2·50	36·37	40 73	5·00	82·10			"
23	19760	9·20	41·79	48·71	18·40	108·90			"
24	19761	5·65	38·99	43·67	11·30	93·96			"
25	19762	9·30	40·31	45·15	18·60	104·06			"
26	19763	8·69	45·00	50·32	17·38	112·70			Fiset.
27	19764	6 01	49·87	49·68	12·02	110·57			"
28	19765	1·53	35 06	35·53	3·06	73·65			"
29	19766	6.14	50·25	50·48	12·28	113·01			"
30	19767	3·00	35·25	35·70	6·00	76·95			"
31	19768	15·85	30·44	29·94	31·70	92·08			"
32	19769	9·02	47·10	51·91	18·04	117·05			"
33	19770	15·70	36·38	28·90	31·40	96·68			"
34	19771	6·14	50·02	50·10	12·28	112.40			"
35	19772	4·16	46·35	47·40	8·32	102·07			"
36	20021	5·27	50·25	39·21	10·54	100·00		Bi-carbonate soda by difference	Bowman.
37	20022	8·02	48·57	35·39	16·04	100·00		"	"
38	20023	7 85	42·37	41·93	15·70	100 00		"	"
39	20024	5·63	51·15	37·59	11·26	100·00		"	"
40	20025	5·63	49·68	39·06	11·26	100·00		"	"

41	20793	4·17	35·72	47·03	8·34	108·40	7·42	Citric Acid = 9·89	Kenri
42	20794	3·13	38·87	50·14	6·26	113·14	7·29	" = 10·58	"
43	20795	10·05	27·40	50·54	20·10	116·92	.....	" = 18·88	"
44	20796	.....	18·71	37·14	.....	.....	11·69	" = 13·08 contains magnesium sulphate instead of phosphate.	"
45	20797	10·71	24·60	42·85	21·42	105·41	.....	Citric Acid = 16·54	"
46	20798	9·41	23·32	44·40	18·82	106·66	.....	" = 20·12	"
47	20799	2·22	19·52	35·43	4·44	103·44	29·41	" = 14·64	"
48	20800	4·83	14·69	49·97	9·66	107·62	.....	" = 33·30	"
49	20801	4·86	38·85	27·29	9·72	75·86	.....	.....	Ellis.
50	20802	2·83	35·35	22·13	5·66	63·14	.....	.....	"
51	20803	9·73	50·80	30·53	19·46	100·79	.....	.....	"
52	20804	9·38	51·76	27·56	18·76	98·08	.....	.....	"
53	20805	5·17	52·36	34·07	10·34	96·77	.....	.....	"
54	20806	6·10	57·25	33·78	12·20	103·23	.....	.....	"
55	20807	17·06	12·49	24·33	34·12	70·94	.....	.....	"
56	20808	6·45	24·24	35·69	12·90	72·83	.....	.....	"
57	20809	8·15	55·53	15·93	16·30	87·76	.....	.....	"
58	20810	5·07	46·26	32·73	10·14	89 13	.....	.....	"
59	21524	25·94	None.	.....	51·88	.....	.....	.....	Fagan.
60	21545	5·56	32·25	28 56	11·12	71·93	.....	.....	"
61	17271	9·67	41·64	30·01	.....	.....	.....	.....	Kenrick.
62	20762	3·98	41·28	44·35	.....	.....	.....	.....	Valade.
63	19389	3·56	44·50	.....	.....	.....	12·14	.....	Harrison.
64	20777	6·14	48·65	36·85	12·29	97.79	.....	.....	Ellis.
65	19967	2·81	53·55	36·63	.....	.....	.....	.....	Fiset.

Appendix.—At the same time that the first collection of Effervescent Phosphate of Soda was made, a few samples of two much advertised preparations, believed to have somewhat similar aperient properties, were obtained and analysed, I referto Eno's Fruit Salt and Abbey's Effervescent Salt.

Eno's Fruit Salt (No. 20,778).—This sample was analysed by Dr. Ellis, in October, 1900.

The following are his results :—

Sodium Bi-carbonate	50·01 Per cent.
Citric acid	47·11 "

Abbey's Effervescent Salt No. 17,272 (Kenrick), No. 19,388 (Harrison).

Sulphuric acid (SO_3)		1·60
Magnesia MgO	0·86	0·83
Calculated to Epsom Salts	5·29	5·10
Potash (K_2O)	1·61	2·25
Soda Na_2O	13·58	19·83
Calculated to bi-carb	36·80	53·70
Carbon dioxide	18·67	.....
Chlorine in Chlorides	0·07	.....
Cane sugar	12·34	15·38
Tartaric acid	40·45	39·75
Reducing Sugar	1·73	

The important feature of each preparation is the development, by solution, of an alkaline citrate or tartrate, and they resemble in many respects the Sodii Citro-Tartras effervescens of the British Pharmacopœia.

A. McG.

APPENDIX P.

BULLETIN No. 78.—WHITE LEAD IN OIL.

Ottawa, Aug. 22, 1901.

W. J. Gerald, Esq.,
Deputy Minister of Inland Revenue.

Sir,—In accordance with the instructions of your predecessor, a collection of samples of white lead in oil, was made in the months of February and March last. 99 samples were collected in all, and submitted to the district analysts for examination. The results are shown in the subjoined table, and the following is a general view of the origin and character of the samples :—

No. of Samples.	Where Collected.	Sold as Pure But Adulterated.	Adulterated.	Genuine or Unadulterated.
8	Halifax, N.S.	4	2	2
4	St. John, N.B.	0	1	3
4	Fredericton, N.B.	1	0	3
5	Montreal, P.Q.	3	1	1
2	St. Hyacinthe	0	0	2
3	St. Johns	1	0	2
2	Three Rivers	0	0	2
4	Quebec	4	0	0
6	Ottawa, Ont.	2	2	2
4	Brockville	0	2	2
4	Kingston	0	1	3
1	Stratford	0	0	1
2	Listowel.	1	0	1
2	Palmerston	0	0	2
2	Mount Forest	0	1	1
4	Owen Sound	1	1	2
2	Shelburne, Ont	0	0	2
3	Orangeville	0	0	3
1	Tottenham	0	0	1
2	Alliston	0	0	2
2	Collingwood	0	0	2
2	Barrie	0	0	2
2	Guelph	1	0	1
1	Berlin	0	0	1
2	Waterloo	1	0	1
1	Goderich	1	0	0
1	Clinton	1	0	0
11	Winnipeg, Man	2	4	5
1	St. Boniface.	0	0	1
8	Vancouver, B.C.	2	2	4
3	New Westminster	0	1	2
99		25	18	56

In the foregoing statement I have distinguished between those of the adulterated samples which have been sold as 'pure' or 'genuine' and others which have been sold simply as 'white lead' or under fancy names, such as 'No. 1' 'Anchor' 'Extra' 'Compound' &c. This is in accordance with the provisions of the Act in restraint of fraudulent sale or marking, which prohibits the use of the terms 'pure' or 'genuine' unless the white lead in oil has the composition defined in Schedule A of the Act in

question. Out of the 99 samples collected, 56 were found to be genuine, 25 of the adulterated samples had been sold as pure, and the remaining 18 were sold without guarantee. The latter samples have all been characterised by the district analysts as 'adulterated', a perfectly justifiable proceeding on their part. This will be evident when it is considered that these sophisticated samples are in many cases marked simply 'white lead', sometimes with the words in addition, 'Warranted' 'No. 1' 'Extra' &c. The amount of admixture of the 'Barytes' varies from 12 to 78 per cent. It would be equally to the advantage of the consumer and manufacturer if the percentage present of adulterant were stated on the label. Since pure dry white lead contains 86·32 per cent lead oxide, it follows that, when ground with 8 per cent oil, the resulting pigment should contain 79·41 per cent lead oxide.

With reference to the 25 adulterated samples which were sold as pure, the vendors were required, in accordance with Section 11 of the Adulteration Act to pay the expense of collecting and analysing the samples, amounting in each case to $9. Eighteen of these vendors complied with the demand; one appealed to the chief analyst with the result that the finding of the district analyst was confirmed; and two were relieved on showing that their samples had not been sold as pure. There still remain five vendors of this class, against whom it has been recommended that prosecutions should be instituted.

In four of the samples described in the accompanying table, the manufacturers have thought fit to print on their labels for the pure article, the words 'Government Standard'. Since the department has not taken any action beyond carrying out the provisions of the Act in restraint of Fraudulent Sale or marking, it would seem wise to discountenance the use of the words just quoted.

I beg to recommend the publication of this report and table.

I have the honour to be sir,

Your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

SAMPLES OF WHITE LEAD IN OIL

RESULTS of the Examination of

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Sample sold as	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1901.			$ cts.	*Official Analyst, M. Bowman, Halifax, N.S.*	*Halifax, N.S.*	
Feb. 19	20031	3 lbs.....	0 36	Pure white lead.... .	F. Reardon, painter...	P. D. Dods & Co., Montreal.
" 19	20032	3 "	0 25	"	W. Horton & Son, painters.	" "
" 19	20033	3 "	0 35	H & P Anchor brand; decorative white lead	G. H. Cutlip, painter..	Henderson & Potts, Halifax, N.S.
" 19	20034	3 "	0 30	Ramsay's Exterior....	Moore & Martin, painters.	A. Ramsay & Co., Montreal.
" 20	20035	3 "	0 30	....	Black Bros. & Co., hardware.	British North American Paint Co., Montreal.
" 20	20036	3 "	0 30	London No. 1 not guaranteed pure.	A. J. Grant & Co., hardware.	Henderson & Potts, Halifax, N.S.
" 20	20037	3 "	0 30	Green Seal brand; pure white lead.	Crowell Bros., hardware.	Sherwin & Williams Co., Montreal.
" 20	20038	3 "	0 30	B B genuine white lead.	Walsh Bros.....	Brandram Bros., London, England.
					St. John, N.B.	
" 18	17768	3 "	0 30	Chemically pure.....	James Robertson Co., Limited.	Vendors.....
" 18	17769	3 " .. .	0 30	"Decorators" pure lead; Association No. 357963.	A. M. Rowan, 331 Main street.	Canada Paint Co., Montreal.
" 18	17770	3 " (1 lb. tins.)	0 33	Pure lead	P. Nase & Son, 70 Bridge street.	Henderson & Potts, Halifax, N.S.
" 19	17771	6 lbs. (3 tins.)	0 72	Not guaranteed pure..	W. H. Thorne & Co., Prince Wm. street.	British North American Colour Co.
					Fredericton, N.B.	
" 26	17772	3 lbs.....	0 30	"Decorators" pure...	J. G. Neill, 354 Queen street.	P. D. Dods & Co., Montreal.
" 26	17773	3 "	0 30	Green Seal brand; strictly pure.	" "	Sherwin & Williams Co., Montreal.
" 26	17774	3 "	0 30	Brandram's genuine...	G. Tweeddale & Co., Queen street.	Henderson & Potts, Halifax, N.S.
" 26	17775	3 "	0 30	Elephant brand; Association No. 592217.	R. Chestnut & Sons, Queen street.	Canada Paint Co., Montreal.
				Official Analyst Dr. M. Fiset, Quebec.	*Montreal.*	
" 14	19785	3 "	0 24	"Decorators" pure white lead.	E. Archambault, 661 Notre Dame street.	P. D. Dods & Co., Montreal.
" 14	19786	3 "	0 24	Pure white lead.....	" "	" "
" 16	19787	3 "	0 24	Special "decorators" white lead; warranted.	H. Sylvester & Son, 701 St. Lawrence street.	" "
					St. Hyacinthe, Que.	
" 18	19788	3 "	0 23	Warranted pure.....	Eugene L. Desautel, Cascade street.	Canada Paint Co.....
" 18	19789	3 "	0 24	Association No. 597670	N. Beaunayer, Cascade street.	Henderson & Potts, Halifax, N.S.
					Montreal.	
19	19791	3 "	0 27	Pure white lead.....	A. Beaudoin, 49 St. Lawrence street.	P. D. Dods & Co., Montreal.
19	19792	3 "	0 30	Association No. 606202	Wall Bros., 15b Bleury street.	Canada Paint Co.....

SESSIONAL PAPER No. 14

99 Samples of White Lead in Oil.

Results of Analysis.				No. of Sample.	Remarks of Official Analyst.
Lead Oxide.	Carbon Dioxide.	Barium Sulphate.	Oil.		
p. c.	p. c.	p. c.	p. c.		
.....	.....	61·13	.. ..	20031	Adulterated with barium sulphate.
.....	....	17·09	.....	20032	" "
.. . .	.....	26·58	.....	20033	" "
..... .	.....	22·19	....	20034	" "
.. ..	.....	62·51	.....	20035	" "
.....	....	40·67	... .	20036	" "
80·41	....	.....	... .	20037	Unadulterated.
80·49	.....	....	.....	20038	"
77·39	.....	.....	6·77	17768	"
79·48	.....	. .....	6·24	17769	"
75·58	.....	. .....	7·39	17770	"
23·91	.....	57·20	7·68	17771	Adulterated with barium sulphate.
70·34	....	7·59	4·79	17772	" "
80·36	.....	.....	4·00	17773	Unadulterated.
79·67	..... .	.....	4·97	17774	"
77·91	....	.....	7·24	17775	"
74·10	....	6·80	7·26	19785	Adulterated with barium sulphate.
75·05	.....	6·85	6·24	19986	" "
56·85	....	27·50	5·38	19787	" "
79·85	....	.....	7·00	19788	Genuine.
79·95	....	.....	5·32	19789	"
77·25	.....	3·25	7·28	19791	Adulterated with barium sulphate.
78·95	.....	.....	7·46	19792	Genuine.

RESULTS of the Examination of

Date of Collection.	No. of Sample.	Quantity Purchased.	Cost.	Sample sold as	NAME AND ADDRESS OF Vendor.	NAME AND ADDRESS OF Manufacturer or Furnisher as given by Vendor.
1901.			$ cts.		*St. Johns, Que.*	
Feb. 21	19793	3 lbs.....	0 25	Pure white lead.	J. A. Lomme, Richelieu street.	Dominion Oil Cloth Co., Montreal.
" 21	19794	3 "	0 24	"	C. O. Gervais, Richelieu street.	P. D. Dods & Co., Montreal.
" 21	19795	3 "	0 24	Pure	Alex. Godin.....	L. Lafleur, Montreal....
					Three Rivers, Que.	
" 22	19796	3 "	0 24	Chemically pure white lead.	Josh. Godin et fils, 10 Forges street.	J. Robertson Co., Ltd., Montreal.
" 22	19797	3 "	0 21	Seal brand strictly pure.	Panneton & Blouin ...	Sherwin & Williams, Montreal.
					Quebec.	
" 27	19798	3 "	0 30	Pure...	Lapointe & Lapointe, 100 Crown street.	P. D. Dods & Co., Montreal.
" 27	19799	3 "	0 30	"	Gauthier & Frere, St. Joseph street.	Henderson & Potts, Halifax, N.S.
" 27	19800	3 "	0 25	"	L. C. Giguère, 314 St. Joseph street.	P. D. Dods & Co., Montreal.
" 27	19801	3 "	0 25	" taken from 200 lbs barrel.	Pouliot & Gervais, 402 St. Joseph street.	" "
				Official Analyst, Dr. F. X. Valade, Ottawa.	*Ottawa.*	
" 14	20811	4 lbs.....	0 32	Warranted pure; from 25 lb. keg; association No. 503690.	John Storr, 404 Bank St.	Wm. Hill, Montreal....
" 14	20812	3½ lbs.....	0 25	Chemically pure; association No. 545833.	Thos. Birkett & Son, Bank St.	Montreal Rolling Mills Company.
" 14	20813	3 tins (6 lbs.)	0 60	Not guaranteed	" " ..	" " ..
" 14	20814	3 tins (3 lbs.)	0 30	"	W. Graham, Bank St.	British North America Colour Company.
" 14	20815	5 lbs. from 25 lb. keg.	0 50	Guaranteed to be absolutely pure.	Geo. Philbert, 97 Clarence St.	P. D. Dods & Co., Montreal.
" 14	20816	25 lb. can.	1 85	"Decorators" pure...	O'Connor & O'Callaghan Co., 819 Bank St.	" " ..
					Brockville, Ont.	
" 15	20818	4 lbs. from 25 lb. keg.	0 32	Anchor Decorative....	A. G. Dobbie & Co....	Henderson & Potts, Halifax, N.S.
" 15	20819	5 lbs. from 25 lb. keg.	0 40	"Decorators"; warranted pure; Association No. 554231.	B. D. Steacy.....	The Canada Paint Co., Montreal.
" 15	20820	" ..	0 40	Elephant brand; genuine; Association No. 516306.	"	" " ..
" 15	20821	3 tins (9 lbs.)	0 99	Not guaranteed	R. H. Smart.....	Name not on label; vendor purchased from P. D. Dods & Co.
					Kingston, Ont.	
" 16	20822	5 lbs. from 25 lb. keg.	0 40	Elephant brand; Association No. 358873.	A. Strachan	Canada Paint Co., Montreal.
16	20823	4½ lbs. from 25 lb. keg.	0 25	Tiger brand; chemically pure; Association No. 576563.	"	Montreal Rolling Mills Company.
16	20824	" ..	0 32	Maple Leaf; extra white lead.	John Corbett.....	" " ..
16	20825	6 lbs. from 25 lb. keg.	0 48	Government Standard; pure white lead.	W. A. Mitchell.....	Elliott & Co., Toronto...

SESSIONAL PAPER No. 14

99 Samples of White Lead in Oil—*Continued.*

Results of Analysis.					Remarks of Official Analyst.
Lead Oxide.	Carbon Dioxide.	Barium Sulphate.	Oil.	No. of Sample.	
p. c.	p. c.	p. c.	p. c.		
79·40	.....	. . ...	6·96	19793	Genuine.
76·45	.....	3·65	6·94	19794	Adulterated with barium sulphate.
79·95	....	.....	6·76	19795	Genuine.
79·65	..... .	.....	7·06	19796	"
80·35	.....	.....	5·95	19797	"
75·45	.....	5·40	7·24	19798	Adulterated with barium sulphate.
63·55	.....	20·00	6·34	19799	" "
72·10	.....	7·85	8·14	19800	" "
74·25	....	6·25	7·42	19801	" "
79·50	8·87	.. ..	8·05	20811	Not adulterated.
79·44	8 79	. ...	7·94	20812	"
35·19	4·00	50·29	8·74	20813	Adulterated.
35·87	4·22	48·36	9·99	20814	"
72·30	7·82	7·47	8·22	20815	"
71·20	7·50	8·17	9·24	20816	"
56·57	6·29	27·54	7·38	20818	"
80·72	9·05	.....	7·14	20819	Not adulterated
79·63	8·44	... .	7·98	20820	"
49·85	5·46	34·48	8·54	20821	Adulterated.
80·44	8·94	....	7·08	20822	Not adulterated
78·24	8·56	. .. .	8·22	20823	"
51·12	5·52	32·77	7·36	20824	Adulterated.
78·44	8·27	.....	8·56	20825	Not adulterated

RESULTS of the Examination of

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Sample sold as	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1901.			$ cts.	*Official Analyst, Dr. W. H. Ellis, Toronto.*	*Stratford, Ont.*	
Feb. 18	19452	3 lbs.	0 24	Elephant brand; pure.	Graber & Son... ..... *Listowel, Ont.*	Canada Paint Co., Montreal.
" 18	19453	3 "	0 30	Pure	Adolph & Bonnett....	Elliott & Co., Toronto...
" 18	19454	3 "	0 25	"	S. Bicker..... *Palmerston, Ont.*	P. D. Dods & Co., Montreal.
" 18	19455	3 "	0 25	Elephant brand; genuine.	Chalmer Bros.....	Canada Paint Co., Montreal.
" 18	19456	3 "	0 25	Pure; Association No. 448413.	Wm. Lynch ..... . *Mount Forest, Ont.*	" " ..
" 19	19457	3 "	0 25	Genuine; Association No. 448185.	J. P. Noonan.....	" " .
" 19	19458	3 "	0 25	Extra Standard.....	Scott & Murphy ..... *Owen Sound, Ont.*	Sanderson Pearcy, Toronto.
" 20	19459	3 "	0 25	Pure	Chester Bros.....	P. D. Dods & Co., Montreal.
" 20	19460	3 "	0 25	Pure; Association No. 423460.	"	Ontario Lead and Wire Co., Toronto.
" 20	19461	3 "	0 25	Unicorn white lead; Association No. 550842.	F. N. Lepan	A. R. Ramsay & Son, Montreal.
" 21	19462	3 "	0 25	External white lead..	" ..... *Shelburne, Ont.*	" " ..
" 21	19463	3 " ...	0 25	Pure; Government Standard.	W. A. Hillhouse	Elliott & Co., Toronto...
" 21	19464	3 "	0 25	Pure; Champion white lead.	J. J. Metcalfe ..... *Orangeville, Ont.*	Steward & Wood, Toronto
" 21	19465	3 "	0 25	Pure; Government Standard white lead.	Brett & Taylor.....	F. Frost, Toronto..... .
" 21	19466	3 "	0 25	Pure; Association No. 301047.	Adamson, Hewett & Sproal.	Canada Paint Co., Montreal.
" 21	19467	3 "	0 25	Pure; Association No. 541970. *Official Analyst, F. T. Harrison, London, Ont.*	F. J. Marshall..... *Tottenham, Ont.*	Ontario Lead and Wire Co., Toronto.
" 22	19468	3 "	0 25	Chemically pure.....	L. P. Foucar . ..... *Alliston, Ont.*	Jas. Robertson & Co., Toronto.
" 22	19469	3 " ...	0 25	Pure	J. J. Cain.....	Elliott & Co., Toronto...
" 22	19470	3 "	0 25	Pure; Elephant brand; Association No. 567370.	W. B. Clifton.....	A. Ramsay & Son, Montreal.

99 Samples of White Lead in Oil—*Continued.*

Results of Analysis.				No. of Sample.	Remarks of Official Analyst.
Lead Oxide.	Carbon Dioxide.	Barium Sulphate.	Oil.		
p. c.	p. c.	p. c.	p. c.		
74·72	12·13	.....	12·09	19452	Genuine.
74·60	11·53	.....	12·58	19453	"
65·27	8·88	13·10	11·14	19454	Adulterated by admixture with barium sulphate to the extent of 13 per cent.
81·40	11·55	.....	5·23	19455	Genuine.
78·08	11·16	.....	9·05	19456	"
76·14	9·92	.....	11·89	19457	"
35·54	4·88	28·21	30·51	19458	Adulterated by admixture with 28 per cent of barium sulphate.
66·92	8·62	12·44	10·17	19459	Adulterated by admixture with 12 per cent of barium sulphate.
74·85	10·26	.....	13·07	19460	Genuine.
76·76	11·51	.....	10·26	19461	"
34·65	5·09	25·81	33·85	19462	Adulterated by admixture with 25 per cent of barium sulphate.
75·87	12·30	.....	10·75	19463	Genuine.
77·04	11·65	.....	9·87	19464	"
77·40	10·91	.....	9·93	19465	"
75·50	11·10	.....	11·87	19466	"
75·60	10·18	.....	12·32	19467	"
78·86	12·20	.....	7·60	19468	Unadulterated.
78·59	12·58	.....	8·44	19469	"
78·50	10·76	.....	7·76	19470	"

RESULTS of the Examination of 99

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Sample sold as	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1901.			$ cts.		*Collingwood, Ont.*	
Feb. 22	19471	3 lbs.....	0 25	Pure; Association No. 557905.	White Bros.....	Canada Paint Co., Montreal.
" 22	19472	3 "	0 25	Pure; Association No. 594086.	J. Henderson..... *Barrie, Ont.*	" "
" 22	19473	3 "	0 25	Pure	Johnson & Warren....	Jas. Robertson & Co., Toronto.
" 22	19474	3 "	0 25	Pure; Association No. 567415.	J. R. Harbly..... *Guelph, Ont.*	Canada Paint Co., Montreal.
" 22	19475	3 "	0 25	"Decorators" pure....	G. A. Richardson.....	P. D. Dods & Co., Montreal.
" 22	19476	3 "	0 25	Pure; Association No. 448461.	John M. Bond..... *Berlin, Ont.*	Canada Paint Co.....
" 22	19477	3 "	0 25	Pure	Peter Hyman..... *Waterloo, Ont.*	Jas. Robertson & Co., Toronto.
" 22	19479	3 "	0 25	"	M. Werchal & Son....	" "
" 22	19480	3 "	0 25	"	Leitch & Liphardt.... *Goderich, Ont.*	P. D. Dods & Co., Montreal.
" 22	19481	3 "	0 25	"Decorators" pure...	A. McD. Allen..... *Clinton, Ont.*	" "
" 22	19482	3 "	0 25	" .... *Official Analyst, E. B. Kenrick, Winnipeg, Man.*	Davis & Rowlan..... *Winnipeg, Man.*	"
" 21	17310	3 tins.....	0 45	"Decorators" pure...	J. H. Ashdown.....	Canada Paint Co., Montreal.
" 21	17311	3 "	0 30	Compound.....	"	" "
" 21	17312	2 lbs.....	0 20	Pure; Association No. 566601.	"	" "
" 22	17313	3 "	0 30	Pure (Crown brand); Association No. 586955	G. F. Stephens Co....	" "
" 25	17314	3 "	0 30	Ramsay's Exterior Compound.	R. Wyatt.....	Ramsay & Son, Montreal
" 25	17315	3 "	0 30	"Decorators" pure...	Mackenzie Bros.	P. D. Dods & Co., Montreal.
" 26	17316	3 "	0 30	Pure; Association No. 570826.	F. W. Weir & Co.....	Canada Paint Co.....
" 26	17317	3 "	0 30	Pure; Association No. 467369.	C. A. Baskerville.....	" .....
" 26	17318	3 tins (2 lbs. each)	1 00	Compound.....	Watt & Gordon..... *St. Boniface, Man.*	" .....
" 27	17319	3 lbs.....	0 30	Pure; Association No. 473026.	Allaire & Bleau.....	" .....

Samples of White Lead in Oil—*Continued.*

Results of Analysis.				No. of Sample.	Remarks of Official Analys
Lead Oxide.	Carbon Dioxide.	Barium Sulphate.	Oil.		
p. c.	p. c.	p. c.	p. c.		
79·16	12·08	... .	7·56	19471	Unadulterated.
76·52	11·73	.....	10·58	19472	"
79·31	12·94	.....	6·84	19473	"
79·37	12·30	.....	7·06	19474	"
71·96	12·08	7·96	8·00	19475	Adulterated with sulphate of barium.
78·93	12·86	.....	7·34	19476	Unadulterated.
79·17	11·25	.....	8·31	19477	"
78·87	12·40	....	7·30	19479	"
65·76	9·57	17·42	6·28	19480	Adulterated with barium sulphate.
49·48	7·71	31·45	9·60	19481	" "
69·54	10·21	7·02	10·56	19482	" "
77·71	11·42	.....	8·69	17310	Genuine.
26·92	3·63	58·50	7·91	17311	Adulterated.
80·50	11·49	.....	5·63	17312	Genuine.
78·32	11·37	.....	8·45	17313	"
51·50	6·56	21·92	8·77	17314	Adulterated.
66·34	9·10	13·36	7·72	17315	"
77·13	10·02	... .	7·97	17316	Genuine.
78·38	11·69	.....	7·81	17317	"
23·31	3·10	60·25	10·26	17318	Adulterated.
76·53	11·30	.....	10·10	17319	Genuine.

RESULTS of the Examination of 99

Date of Collection.	No. of Sample.	Quantity purchased.	Cost.	Sample sold as	Name and Address of Vendor.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1901.					*Winnipeg, Man.*	
Feb. 28	17320	3 lbs.....	0 30	"Decorators" pure...	W. R. Talbot & Co ...	P. D. Dods & Co.....
" 28	17321	3 tins.....	0 65	Compound.....	The Jas. Robertson Co.	Vendors..... .....
				Official Analyst, Dr. C. J. Fagan, Victoria, B.C.	*Vancouver, B.C.*	
Mar. 1	21568	15 lbs....	1 15	Pure; Association No. 460617.	Lewis & Sills	British American Paint Company.
" 1	21569	14½ "	1 20	"Decorators" pure...	McTaggart & Moserop.	P. D. Dods & Co., Montreal.
" 1	21570	14½ "	1 15	Pure	" " ..	" " ..
" 2	21571	12½ " ...	1 00	Genuine; Association No. 461665.	Thos. Dunn & Co.....	A. Ferguson & Co., Montreal.
" 4	21572	14 "	1 20	Chemically pure; Government standard.	"	Robertson's Dominion Lead Works, Toronto.
" 4	21573	3 2-lb.cans	0 60	....	"	British American Paint Company.
" 4	21574	12½ lbs....	1 10	Tiger brand; pure; Association No. 545431	Vancouver Hardware Company.	Montreal Rolling Mills..
" 4	21575	12½ "	1 00	Extra..	" " ..	" " ..
					New Westminster, B.C.	
" 5	21576	11½ "	0 90	Pure; Association No. 593627.	Cunningham Hardware Company.	A. Ramsay & Son, Montreal.
" 5	21577	11 "	0 85	Pure; Association No. 374277.	" " ..	" " ..
" 6	21578	3 2-lb.cans	0 60	No. 1 on cans.....	McTaggart & Moserop.	P. D. Dods & Co., Montreal.

Samples of White Lead in Oil—*Concluded.*

Results of Analysis.				No. of Sample.	Remarks of Official Analyst.
Lead Oxide.	Carbon Dioxide.	Barium Sulphate.	Oil.		
p.c.	p.c.	p.c.	p.c.		
52·47	7·16	29.66	7·92	17320	Adulterated.
27·13	3·78	58·24	7·99	17321	"
After extraction of the oil.					
86·80	8·60	.....	6·60	21568	Genuine.
72·87	10·65	15·00	7·70	21569	Barium added; adulterated.
75·44	5·85	11·50	7·70	21570	"
74·69	7·10	.....	6·50	21571	Genuine.
87·87	11·40	.....	6·80	21572	"
15·32	4·10	78·00	9·90	21573	Adulterated with barium sulphate.
86·67	10·80	....	5·70	21574	Genuine.
47·15	7·55	45·70	6·30	21575	Adulterated with barium sulphate.
85·20	11·90	....	7·10	21576	Genuine.
86·30	11·40	....	7·00	21577	"
17·57	2·40	70·30	9·30	21578	Adulterated with barium sulphate.

REPORT

OF THE

MINISTER OF AGRICULTURE

FOR THE

DOMINION OF CANADA

FOR THE

YEAR ENDED OCTOBER 31

1901

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1902

[No. 15—1902]

TABLE OF CONTENTS

Minister's Report :	Page.
I. General Remarks	v
The Census	vi
Glasgow Exhibition	viii
Pan-American Exhibition	viii
Testing cattle for exportation to United States	x
Canadian Veterinary Officer in Great Britain	x
Visit to Great Britain	x
II. Arts and Agriculture, containing	xiii
Commissioner's Branch	xiii
General scope of the work	xiii
Agricultural products for South Africa	xv
Seed grain competition	xvi
Extension of markets division	xvi
Cooled air on steamships	xvi
Officers to observe handling	xvii
Various food products	xviii
Value of farm products exported	xix
Cold storage division	xx
Cold storage on steamships	xx
Cold storage on railways	xxi
Cold storage warehouses	xxi
Cold storage at creameries	xxii
Cold storage inspectors	xxii
Live stock division	xxiii
Sales of stock	xxiii
Pan-American Exposition	xxiv
Township fairs and farmers' institutes	xxiv
Fattening of chickens	xxv
Dairy division	xxvi
North-west Territories Creameries	xxvi
Creameries in Nova Scotia	xxvi
Official referee for butter and cheese at Montreal	xxvii
General dairying service in the provinces	xxvii
Branding and Registration Bill	xxviii
Exports of butter and cheese	xxviii
Imports of Great Britain	xxix
Fruit division	xxix
Fruit Marks Act	xxix

PAGE.

II. Arts and Agriculture—*Concluded.*
- Crops . . . xxx
- Cattle trade . . . xxxiii
- Experimental Farms Branch . . . xxxiv
  - Improvement of seed . . . xxxv
  - New fruits for the colder sections . . . xxxv
  - Pan-American Exposition . . . xxxvi
  - Glasgow Exhibition . . . xxxvi
  - Central Experimental Farm . . . xxxvi
    - Agriculture . . . xxxvi
    - Horticulture . . . xxxvii
    - Entomology and botany . . . xxxviii
    - Chemistry . . . xli
    - Poultry . . . xliii
  - Experimental Farm for the Maritime Provinces . . . xliii
  - Experimental Farm for Manitoba . . . xliv
  - Experimental Farm for British Columbia . . . xlv
- Archives . . . xlvi

III. Patents of Invention . . . xlvii

IV. Copyrights, Trade Marks, Industrial Designs and Timber Marks . . . l

V. Public Health and Quarantine . . . li
- Bubonic plague . . . li
- Small-pox . . . lii
- National Bacteriological Laboratory . . . lii
- Tracadie Lazaretto . . . liii
- Public Works Health Act . . . liii

VI. Statistics . . . liv
- Health statistics . . . lv
- Criminal statistics . . . lvi
- The Statistical Year-book . . . lvi

APPENDICES : (See detailed index at back of report).

REPORT

OF THE

MINISTER OF AGRICULTURE

1901

To His Excellency the Right Honourable Sir Gilbert John Elliot, *Earl of Minto and Viscount Melgund of Melgund, County of Forfar, in the Peerage of the United Kingdom, Baron Minto of Minto, County of Roxburgh, in the Peerage of Great Britain, Baronet of Nova Scotia, Governor General of Canada.*

May it Please Your Excellency—

I have the honour to submit to Your Excellency the annual report of the Department of Agriculture, for the year ended October 31, 1901.

I.—GENERAL REMARKS.

A synopsis of the work of the Department and of the operations of the various branches comprised therein is laid before Your Excellency. The work in each has been efficiently carried out.

The legislation affecting the Department during the last session consisted of chap. 27, 1 Edw. VII., intituled, 'An Act to provide for the Marking and Inspection of Packages containing Fruit for Sale.' This Act came into force on July 1, 1901.

The Right Honourable the Secretary of State for the Colonies forwarded under a circular letter, dated August 25, 1900, an Imperial memorandum issued by the Board of Agriculture relative to the importation of dogs into Great Britain from abroad. This Imperial memorandum will be found as an appendix hereto. (See appendix No. 37.)

By Order in Council of January 5, 1901, in virtue of the provisions of section 5, chap. 23, 61 Victoria, intituled, 'An Act to protect Canada from the Insect Pest, known as the San José Scale,' and of 63-64 Victoria, chap. 31, 'An Act to amend the San José Scale Act,' exemption from the operations of the above mentioned Act was authorized of any trees, shrubs, plants, vines, grafts, cuttings or buds, commonly called

nursery stock from any country or state to which 'The San José Scale Act' applies ; and all importations thereof were and are permitted to be entered at the customs ports of St. John, N.B., St. Johns, Que., Niagara Falls and Windsor, Ont., and Winnipeg, Manitoba, between the following dates in each year : March 15 to May 15, in the spring, and October 7 to December 7, in the autumn ; and at Vancouver, British Columbia, during the winter months only from October 15 to March 15, at which ports they will be thoroughly fumigated with hydrocyanic acid gas by a competent government official in accordance with the most approved methods.

It was also ordered that all shipments made in accordance with the above should be entirely at the risk of the shippers or consignees, the government assuming no risk whatever, and that packages must be addressed so as to enter Canada at one of the above named ports of entry, and the route by which they are to be shipped clearly stated upon each package.

Well matured and thoroughly dormant nursery stock may be safely treated, but as there is danger of serious injury to the trees if fumigated in the autumn before the buds are thoroughly dormant or in the spring after the buds have begun to unfold, it was ordered that all stock which when received is immature or too far advanced for safe treatment should be refused entry and held at the risk of the shipper. Vide *Canada Gazette* (vol. xxxiv, p. 1268).

By proclamation dated January 8, 1901, under the provisions of 'The Census Act,' it was ordered that the following directions should be observed :—

1. That the population to be recorded shall be the population in existence on 31st day of March, A.D. 1901, and that other information to be gathered shall also have reference to the same date, unless otherwise determined by our Minister of Agriculture for Canada, as regards information under schedules 8, 9, 10 and 11.

That the procedure to be followed for obtaining the enumeration of the population shall be in accordance with the system known by the name of the *de jure* system.

2. That the division of the country into census districts and sub-districts shall correspond respectively as nearly as may be with existing electoral divisions and subdivisions, and that except as may be otherwise directed by our Minister of Agriculture the units of enumeration for census purposes shall be the polling subdivision areas of the several electoral divisions adopted for the recent parliamentary elections ; but that in territories not so defined or situated as to admit of adhering to circumscriptions already established, special divisions and sub-divisions shall be formed for census purposes by authority of our Minister of Agriculture.

3. That the sub-districts of a census district shall ordinarily consist of townships, parishes, cities, towns and incorporated villages.

4. That the census officers provided for in section 8 of the Census Act shall comprise four for each of the provinces of Ontario and Quebec and one for each of the other provinces and the North-west Territories, whose duty shall be to instruct census commissioners in the method and work of the census.

5. That there shall be a census commissioner for each census district, or two commissioners if the district is extensive or has a large bi-lingual population or comprises more than one county municipality, and one enumerator for each polling subdivision or for a group of polling subdivisions, when our Minister of Agriculture in special cases so directs ; and the duties of such officers and the period of time within which their returns and reports must be completed and made shall be as provided in

the Act and according to the regulations and instructions authorized by the Act, or as in special cases our Minister of Agriculture may direct.

6. That as in the registration of diseases or causes of death the Bertillon nomenclature is already in use in the provinces of Ontario and Quebec and in the Republic of Mexico, and has been endorsed for adoption on January 1, A.D. 1901, for a period of ten years by the delegates of eighteen countries to the International Commission which met at Paris during the year 1900, to deal with the subject (including the delegate of the United States), and as uniformity of statistics is essential in making comparative studies of mortality, it is advisable to follow the Bertillon or International nomenclature in taking the census of mortality (schedule 3) ; and that, to ensure as complete a record of diseases or causes of death as possible, it is further advisable to obtain the co-operation of provincial or other local officers of vital statistics where such officers have been organized, under arrangements and terms to be sanctioned by our Minister of Agriculture.

7. That at the discretion of our Minister of Agriculture, and subject to such limitations of territory and of industries as he may determine, the census of manufactures (schedule 8), and the census of products of the forest (schedule 9), may be entrusted to one or more special agents in each province ; the census of fisheries (schedule 10), subject to limitations of territory, to one or more special agents, or to the Department of Marine and Fisheries, or, in the case of any province which has assumed administration of the fisheries under the decision of the Privy Council, to the provincial officer charged with such administration, and the census of mines and minerals (schedule 11), subject to such limitations of territory and of classes or kinds of mineral products as our Minister of Agriculture shall determine, to the regular enumerators, to special agents, or to the Geological Survey, as may in each case be deemed most advantageous and expedient.

That the details of information and forms to be used shall be as indicated by the schedules following and by the instructions and blank forms issued by our Minister of Agriculture for the working thereof.

The schedules and forms are published in the *Canada Gazette*. Vide *Canada Gazette* (vol. xxxiv, p. 1318).

By proclamation, dated March 31, 1901, under the provisions of 'The Census Act,' the country was divided into census districts, and each census district into subdistricts to correspond respectively, as nearly as may be, with the electoral divisions and subdivisions for the time being ; and, in territories not so defined or so situated as to admit of adhering to circumscriptions already established into special divisions and subdivisions for the purpose of the census as therein set forth. Vide *Canada Gazette* (vol. xxxiv, p. 1894).

By Order in Council of March 23, 1901, the Order in Council of January 5, 1901, was modified, and the admission, at the ports of Winnipeg and Brandon only, of importations of the 'Dakota Cottonwood,' otherwise called 'Necklace Poplar' (Populus Monilifera), without fumigation when shipped from and grown in the State of Dakota, was authorized. Vide *Canada Gazette* (vol. xxxiv, p. 1908).

By Order in Council of May 31, 1901, in virtue of the provisions of section 5 of the Act, chap. 23 of 61 Victoria, intituled, 'An Act to protect Canada from the introduction of the Insect Pest, known as the San José Scale,' the Order in Council of March 23, 1901, admitting at certain ports without fumigation importations of 'Dakota Cottonwood,' from the State of Dakota, was amended by adding thereto, after the

words 'State of Dakota' the words 'or Minnesota.' Vide *Canada Gazette* (vol. xxxiv, p. 2498).

During the current year the work of organizing for the taking of the decennial census has exacted a great deal of attention and labour. It was felt important that a good deal of information which had not been before gathered in Canadian censuses should be obtained. The elaboration of the schedules for this purpose required the attention of an expert in statistics who could devote his whole time and attention to this particular labour. Mr. Archibald Blue was therefore appointed Special Census Commissioner, and has been able to carry out most satisfactorily the taking of the Canadian census. The work of compiling the information obtained is now rapidly proceeding.

During the past year I was obliged to provide for the proper representation of Canada at the International Exhibition at Glasgow and at the Pan-American Exhibition at Buffalo.

At Glasgow I was able to utilize very largely the government exhibits which had been at Paris the year before. I took advantage of the experience of Mr. W. D. Scott, who had been one of the commissioners at Paris, and appointed him the managing commissioner at Glasgow. Colonel William O'Brien and the Honourable Arthur Boyer were also appointed honorary commissioners.

Owing to the eagerness of the Canadian manufacturers to exhibit at Glasgow, notably the agricultural implement makers, the carriage makers and boat builders and furniture and heating apparatus manufacturers, the space allotted to us originally was found to be not nearly sufficient. I was obliged therefore to authorize the erection of a Canadian pavilion. This was found a great advantage, as the experience of all exhibition work has impressed on me most emphatically that the country can be best represented when all the exhibits are placed together in a special Canadian building. We renewed and added to the government exhibits which were sent from Paris, and made a most impressive display of Canadian agriculture and food products and mineral and forestry products from Canada. These attracted a great deal of attention and were the subject of most favourable and admiring comment from visitors and in the press. The manufacturers who exhibited there were able to open up new avenues of considerable trade, and not only disposed of their exhibits but received also a large amount of additional orders as a result of the Canadian display there. The Glasgow Exhibition itself was a remarkable success, having a large balance in hand after paying all expenses.

It was rather late in the season when the decision was arrived at to represent Canada at the Pan-American Exhibition at Buffalo. Mr. William Hutchison, of Ottawa, was appointed commissioner, and owing to his large experience in exhibition matters and his energy and activity, the Canadian pavillion there was promptly put up and handsomely and appropriately decorated so as to display Canadian agricultural and other products. My Department did not undertake there to make any display in the different sections. The Canadian building was more of the nature of an office for the Canadian exhibitors at the exhibition, for immigration purposes and to

form a rendezvous and gathering place for Canadian visitors. In this regard it was eminently successful. At the same time what was in it in the way of Canadian products attracted a great deal of favourable attention and comment. The live stock exhibition at Buffalo was a special feature. In this my department took an active part. The great six months' dairy test was participated in by Canadian herds, just one-half of the entries being Canadian. The test was one as between breeds, five cows of each breed being entered in a group. It was especially noteworthy and gratifying to Canadians to find that of the five leading herds four were Canadian, only the American Guernseys (which was the leading herd) surpassing our four best herds. In the competitions for live stock Canada also carried off an extraordinary number of prizes, much larger in proportion to the number of animals entered than the United States, the only other competitor. This splendid showing has been of great value to Canadian live stock men, and has stimulated more than ever the trade in live stock between Canada and the United States, a trade which has for the last few years been so advantageous to our Canadian farmers. The French Canadian horses and French Canadian cattle made their first appearance in a great international competition, and it was very gratifying to find how well they stood and how much admiration and attention they received. Their appearance has resulted in a very considerable demand for this stock, both from the United States and other parts of Canada.

As has always been my custom, I took occasion to visit the various agricultural gatherings—the Fat Stock Show at Guelph, the meetings of the Farmers and Dairymen of New Brunswick at Fredericton, the Nova Scotia agricultural meeting at Amherst, the District of Bedford Dairymen's Association at Cowansville, and other smaller meetings.

The week of work at Guelph, in December, 1900, was especially interesting. My Department, through Mr. Hodson, live stock commissioner, undertook the management of the programme of lectures and addresses. A number of new items were introduced, notably when the experts on various classes of live stock took representative animals into the lecture hall and pointed out their excellencies and defects. This feature was so popular that the audiences overcrowded the lecture hall, many not being able to get within hearing. It was evident that the eagerness for information was only equalled by the practical and thorough nature of the addresses that were given.

The poultry show at this exhibition assumed such proportions as to be a gratifying proof of the greatly increased interest taken in this branch of production in Canada. The excellency of the entries and the great variety and number of the birds was most extraordinary.

My visit to Fredericton was the first occasion on which I had an opportunity of meeting the representative farmers of New Brunswick. The gathering was a most successful one, and I formed a very high opinion of the possibilities of agricultural development in that province as evidenced by the class of men with whom I came into contact and the evident desire for better organization and greater information shown by those present

Last winter I found it expedient to pay a visit to Washington for the purpose of discussing with the Minister of Agriculture of the United States and his chief veterinary adviser, the subject of tuberculosis in cattle. My own chief veterinary, Dr. McEachran accompanied me.

The Department at Washington had considered it necessary to require that all cattle entering the United States for breeding or dairy purposes should be tested with tuberculin by one of their own officers, and had declined any longer to accept the certificates of English or Canadian veterinaries. Appreciating the difficulties which this arrangement would present to Canadian exporters into the United States, I was able to arrange that the United States authorities should accept the certificates of our permanent officers. This concession was granted and the necessary instructions given to the United States customs authorities. As there is a very considerable export trade constantly going on from Canada to the United States, I found it necessary to appoint two additional permanent officers. As the time of these officers would not necessarily be always occupied in making the tests for export, I have arranged that the services of my permanent staff only shall be utilized for the testing of cattle in Canada on the demand of the owners who wish to have their herds tested at home.

I decided to send a Canadian veterinary to England to make tests for those who wished to import breeding stock from the old country. This was done so that the Canadian official test might be made before the animals were shipped from the old country, it being in the interest of importers that they should be saved the expense of the voyage and the maintenance in quarantine here in cases where the animals failed to pass the test successfully. The certificate of this officer of Canada in England is accepted by the United States authorities for cattle passing through Canada en route to the United States ; we also accepting certificates given by the United States officer in Great Britain.

Dr. J. G. Rutherford, of Portage la Prairie, was detailed for this work and spent the summer in England. It turned out to be most arduous and difficult work for a considerable portion of the time, but it served the purposes desired and was a great boon to Canadian importers of such stock.

For the purpose of discussing with the Imperial authorities the export of Canadian live stock to Great Britain, the further examination of the British markets for Canadian food products, and for the purpose of procuring a number of thoroughbred animals for the experimental farms, I proceeded to Great Britain in the spring, being absent a little over two months. I took with me Prof. Robertson, Mr. F. W. Hodson, Live Stock Commissioner, and Mr. J. H. Grisdale, Agriculturist of the Experimental Farm. The two latter were busily engaged examining the different herds in which we thought it probable we might obtain the animals we desired for the experimental farms. It was intended to import a certain number of what are called milking shorthorns, a certain number of Ayrshire cattle and a certain number of Guernsey cattle. Great difficulty was experienced in obtaining the type of the milking shorthorn that would be eligible for registration in the North American Shorthorn Register. The latter register requires an unbroken tracing to the twentieth volume of the Shorthorn Herd Book in England. We found that a very large number of the best representatives of the milk-

ing shorthorn could not do this, having out-crosses in the latter part of their pedigree. The result was a good deal of loss of time and much travel on the part of the two officers who were charged with the finding of these animals.

In company with my officers I had the advantage of studying a number of the most celebrated herds in England and the principles and practice of breeding adopted by eminent breeders ; also of examining the methods and principles of general farming and stock keeping in the old land.

The result of this work was that we purchased and imported to Canada 10 Ayrshires, 7 Guernseys and 8 shorthorns, which animals are now safely placed on the experimental farms at Ottawa and Nappan, and are attracting much favourable comment.

We also took occasion to visit several of the agricultural fairs, notably the Royal Agricultural Society's Exhibition at Cardiff and the Highland Society's Exhibition at Inverness.

In conjunction with Prof. Robertson I arranged to meet a number of the importers and produce dealers in Glasgow, Liverpool, Manchester and Cardiff, at which places we addressed public meetings and were most hospitably entertained by the various organizations. We also had an opportunity of meeting many business men in London, Bristol and elsewhere, investigating the demands of these markets and working out the problem of how best the Canadian producer and shipper can satisfy the consumer in Great Britain. The information obtained will aid much in the administration of my department, while I have reason to believe that the information about Canada and Canadian production which I was able to lay before those with whom I came in contact, aroused an increased interest in Canada as a food producer, and in our country as a place to which the people from the old lands could advantageously come to make new homes.

The press of Great Britain paid particular attention to these subjects and gave great prominence to Canadian interests during my visit.

During my visit I had several conversations of a formal character with the Minister of Agriculture, the Right Honourable Mr. Hanbury. I laid before him most urgently the unfairness of the scheduling of Canadian cattle in view of the extremely healthy character of the stock in this country. I was gratified to find that Mr. Hanbury, both privately and publicly, was prepared to state and did state that he believed that Canada was entirely free from the contagious cattle diseases against which the English department is so strenuously guarding. He would not, however, hold out hope that they would be able to admit our cattle for ordinary distribution inland from the ports of landing. While I was there numerous representations were made to me from those who were desirous of allowing the free entry of Canadian cattle, they asking me to take part in the agitation to bring the government to do this. I felt that this was not the proper proceeding for a member of the Canadian government to take. Therefore, while I took the opportunity of stating the facts in regard to the health of our cattle, I declined to take part in an agitation in England upon this subject. The agitation culminated in an interview between the representative bodies and Mr. Hanbury, at Edinburgh, shortly after my return to this country. The result was, however, entirely

unsatisfactory from our point of view, as Mr. Hanbury declared unequivocally that as long as he was Minister of Agriculture, the government would not admit any foreign or colonial cattle to free inland delivery in the United Kingdom. I look upon this as settling the question for some years to come, as Mr. Hanbury, undoubtedly spoke the views of the government. The present condition of affairs is statutory and consequently can only be changed by an Act of Parliament which would have to pass both Houses and be signed by the King.

Another matter on which I had a number of interviews with the Imperial officials was that of the purchase of remounts for the Imperial army regularly year by year in Canada. I had the opportunity of meeting the Commander-in-Chief, Earl Roberts, and was put by him in communication with a special committee of the War office which had this question under consideration. I found that Lord Stanley, whom I had personally known here in Ottawa some years ago, was the chairman of this committee. He was very cordial in giving me an abundant opportunity of laying our views before the committee, and from the expressions which were used by him and members of the committee, individually, I have great hopes that the report will be favourable to the continuous and regular purchase of horses in Canada for the Imperial army. No intimation has yet been received of the official report of this committee.

I feel that I must congratulate Canada upon the extraordinary development of her agricultural production. This year, so far as the great west is concerned, has been phenomenal, although I see no reason to doubt that in the future even greater crops may be produced in that fertile region of the Dominion. The varied character of farming in the eastern and older provinces has contributed to render the year's work very satisfactory, some crops being much larger than usual even if some others have been somewhat short. The live stock business has been extremely active and profitable. The general result has been a very large amount of money received by the farmers of Canada and a general and greater confidence amongst them in their business. This has resulted in a definite appreciation in the value of rural land and has stimulated many, not being farmers, to turn their attention to this industry. This is evidenced by the great number of inquiries received by me and the officers of my department in regard to the taking up or purchase of land and the asking of information in regard to the different branches of agriculture in the different sections of the country. At no time in the history of Canada has there been such a great mass of useful information available to the farmers of the country. This information is being collected most systematically and put into a form to make it very valuable and useful to inquirers, the organization of the department in this respect having been recently greatly strengthened.

In consequence of the passage by Parliament of the Fruit Marks Act, it was necessary to organize the administration and enforcement of this Act. I carried out the intentions of the Act by the appointment of a number of inspectors. I felt that as this Act was an entirely new departure, in addition to carrying out the provisions of the Act strictly, it was important that information in regard to it, its scope and its intention, should be spread amongst those engaged in the business of fruit

growing, packing and selling. This has been thoroughly carried out, with the result that a decided improvement has taken place in the packing of fruit in closed packages for sale. In the administration of the law it was believed that it would be better to move a little slowly until such time as the packers of fruit thoroughly understood what was intended and demanded of them. Consequently, I directed my inspectors to be slow to enter prosecutions. Lately, however, we have found it necessary to undertake some prosecutions, and I am gratified to know that the working of the law has been found simple and successful. I trust that the few examples which so far it has been found necessary to make will be effective in causing a still better observance of the law, and a consequent improvement in the packing of Canadian fruit and a greater reputation for our fruit in the markets where it is sold.

II.—ARTS AND AGRICULTURE.

COMMISSIONER'S BRANCH.

GENERAL SCOPE OF THE WORK.

The general object of the work in the Branch of the Commissioner of Agriculture and Dairying is to render assistance towards the improvement of all agricultural products and the means of their production, transportation and marketing, with particular regard to those which may be grouped under the name of food products.

There has been marked progress in recent years, but methods and management have not been made better by nearly all the people who are engaged in producing foods for home consumption and for export. On the whole, greater advancements have been made in the manufacturing industries arising out of agriculture than in the production of the original commodities in the form of crops.

The difficulties of disseminating information so as to reach all the people in a helpful way, are not realized or overcome readily. As a rule, farmers live in a manner comparatively isolated from one another, and are engaged in doing their work singly and separately, while in other occupations, closer contact and some form of co-operation have taken the place of individual management. In the making of agricultural machinery, the large factory, with its organized management and men, has absorbed the small businesses. The roadside or village artisan has no chance except as a repairer, for the manufacturing work has passed into the hands of firms which have large establishments equipped with all sorts of labour-saving machinery and devices, and manned by an army of skilled operators, each worker in his own place at his own task, and all under the direction of a few men of superior commercial intelligence and industrial talent, and specially trained. The changes that have taken place in farming from adopting mixed farming instead of simply growing grain, have been great also, and the farmers are changing their methods to meet the new conditions which have arisen ; but agriculture has not attracted the same class of help, by the consolidation of capital securing and employing the services of especially skilled and trained men to give personal direction to the operations on a large scale.

I mention these matters to indicate that in the midst of increasing difficulties the farmers require help to assist them in the many things they have to do, and do economically, to meet the demands of the markets, which year by year grow more exacting. A superior class of food products is demanded ; consumers are getting more fastidious every year. It does not appear desirable that agriculture should be organized exactly like huge manufacturing and business enterprises, even if it could be. The welfare of the individual farmer and of the state requires that the best information available, as applied to agriculture, should be at his service. It has appeared also desirable that he should receive encouragement, direction and, where necessary, the co-operation of governments at the beginnings of his organized co-operation with other farmers, with merchants, with railway and steamship companies, for the improvement of products, the extension of markets and the improvement of transportation. The Department of Agriculture is trying to provide these forms of help.

This Branch of the Department of Agriculture has been charged with the duty of giving what assistance it can with respect to these matters, and its objects and methods have been of an educational sort. These seem to be safe and effective in helping the farmers to meet the new and old difficulties that surround them. Such forms of help gradually result (1) in increasing the intelligence of the farming population in regard to their own business, (2) in developing practical ability, and (3) in bringing about co-operation. Man for man, Canada has as intelligent a people as can be found anywhere. On the average, the farmers in Canada are not deficient in general intelligence ; but in specific knowledge regarding agriculture, they are in many cases far behind those in other countries who live on the land their fathers lived on before them, and who acquire, almost by inheritance, information with regard to the best methods of management. In a new country and place a farmer cannot find out these for himself in a lifetime. The increase of intelligence with regard to agriculture in all its branches is a purpose and object which the Department continually has before it.

Many men who are thoroughly intelligent are quite deficient in regard to practical ability ; a man may know all about a thing, without being able himself to do it properly. By giving a man object lessons, as well as information, and then letting him try for himself he will develop practical ability. One of the needs of our country is that the boys' capacity and ability to do things with their own hands should be developed and trained from the earliest years by actual practice. Until the boy leaves school and goes on the farm and works there, whatever else is neglected, his desire and power to do something should be guided into right directions and developed by practice.

Another object which the Department has in view is to bring about co-operation between all the interests and persons concerned in having the farm work and the marketing of the farm products done in the best possible way, to get the transportation companies and the commercial concerns to co-operate with the farmers towards obtaining better prices and a larger consumption in our home markets, and a larger place and better prices in the markets of the world.

In soil and in climate—the two physical conditions that control the sorts of food that can be produced—in these two regards Canada is unsurpassed in suitability for turning out fine qualities of the main foods of the northern peoples of the world. For instance, cattle and cattle products are better in northern than in southern countries. The cereals grown in our northern regions are better than those grown in southern climes. Our wheat contains more gluten than that grown in countries further south ; and the flour made from it also contains a higher percentage of flesh-forming or nourishing parts. These are advantages which depend not only upon the ability of the people, but upon the soil and climate of the country.

The Commissioner's Branch has a good deal to do with a large number of persons engaged in industries arising out of agriculture. For instance, there are flour and oatmeal millers who have a hand in preparing the products of grains for the home and foreign markets ; and there are the curers and packers of meats and the manufacturers of cheese and butter. There are those engaged in the transportation and commerce of grain, hay, live stock, meats, butter, cheese, eggs, poultry, fruit and other products. There are those engaged in the canning of fruits and vegetables, which has become a large business ; and those engaged in rasing poultry and eggs, an industry which is becoming increasingly important. The Department has to do with these, as well as with the people who live on the land and work on the farms.

The Commissioner's Branch has several divisions which take up and follow in particular detail the general work which has been mentioned. Some of these are as yet only partially organized. They are the 'Extension of Markets Division,' the 'Cold Storage Division,' the 'Live Stock Division,' the 'Dairy division' and the 'Fruit Division.' In addition to the work of each division, which unavoidably in many cases overlaps, other undertakings of a general character looking towards the advancement of agriculture have been carried on during the year.

AGRICULTURAL PRODUCTS FOR SOUTH AFRICA.

The Department has acted in the capacity of agent for the purchasing and forwarding of agricultural products on account of the Imperial Office. Up to the end of October, the quantities which have been forwarded, are as follows :—

Hay	96,320 tons (of 2,000 lbs.)
Flour	38,285 bags.
Oats	50,200 "
Beef	40,772 cases.
Jams	11,743 "

The expenditure of the Imperial War Office through the Department of Agriculture for the first cost of these products, freight charges, ocean transportation and incidental expenses, has been $4,000,000. By the time the contracts now in hand to be filled by the end of February, 1902, have been completed, an additional expenditure on this account of over three million dollars will have been made by the Imperial War Office through the Department of Agriculture of Canada.

SEED GRAIN COMPETITION.

With a view to stimulating increased interest in the growing and systematic selection of seed grain, a competition among boys and girls living on Canadian farms was started in the spring of 1900. To encourage them in this work, Sir William C. Macdonald, of Montreal, donated the sum of $10,000 to be given in cash prizes according to plans which were arranged by Professor Robertson. These prizes are distributed under the supervision of the Department of Agriculture.

The competitors in the seed grain competition are growing seed grain on specially prepared plots of land, one-quarter of an acre in each plot, selecting seed each year from these plots to sow on the plot for the succeeding year. They gather large, well-filled heads from vigorous plants before the grain is cut and after all the conditions of growth have been observed, and then thresh these heads. By screening and hand-picking the large well-developed grain from those selected heads the seed for next year's seed-grain plot is secured. This means and manner of selecting seed has now been conducted for two years on over eight hundred Canadian farms, which are fairly well distributed throughout the Dominion.

EXTENSION OF MARKETS DIVISION.

By my direction and in company with me, the Commissioner of Agriculture and Dairying visited some points in the United Kingdom during the year. Addresses dealing with the progress of Canada and the improvements in Canadian food products and in the methods of transportation of the same, were delivered to meetings of importing merchants and others in Glasgow, Liverpool, Manchester, Bristol and Cardiff. Conferences were also held with importing merchants to consider improvements which they desired and which might be practicable in the handling of cheese, butter, bacon, eggs, poultry and fruit. Much valuable information was gained from these conferences, and will doubtless prove helpful in the future work of the Department.

COOLED AIR ON STEAMSHIPS.

Conferences were also held with owners and agents of steamship lines plying between ports in Canada and the United Kingdom. The question of arranging for accommodation on steamships by means of circulating cooled air through the places where cheese and apples are stowed had been taken up by correspondence ; it was completed by personal interviews.

Mainly in response to representations made by the Department in previous years, a large number of steamers have been fitted with fans for the forced circulation of air through the holds and tween-decks. To try the new method which was recommended by the Commissioners for the cooling and circulating of air on steamships for the safe carriage of cheese, apples and other perishable products, the owners or agents of the Allan Line, the Thomson Line and the Donaldson Line agreed to fit up one or more steamships of each line. Four steamships were fitted and carried some cheese and apples from Montreal before the closing of navigation. Reports have been received from merchants in the United Kingdom who received cheese *ex* these

steamships speaking most favourably of the condition in which it was carried, and advocating an extension of similar accommodation. A report was received from the Butter and Cheese Association of the Board of Trade of Montreal, as follows :—

'The members of this association have noted with gratification the complete success of the cold air chambers system used on some steamers running from this port during the past season, and they feel they cannot exaggerate the importance of having it installed in every vessel carrying dairy produce from here next season. It is certain that having experienced the benefits of the cooled chambers last season the great majority of British buyers will next year insist on having all goods shipped in these chambers. The demand is likely, therefore, to far exceed the supply unless some effort is made to induce the steamship companies generally to turn all their available cheese carrying space into cold air chambers. This association believes it would be immensely to the advantage of the whole dairy interest were there no other way of shipping possible, than in cooled chambers, and it would heartily join in all efforts made to accomplish this result.'

A communication of a similar character has been received from the Home and Foreign Produce Exchange, Ltd., of London, England, as follows :—

'I beg to inform you that a memorial has been addressed to me, as chairman of the exchange, in the following terms :—

'A few steamers sailing from Montreal to London have been fitted with cool air ventilators, which have proved a great success in carrying Canadian cheese, and it is the opinion of the undersigned that the best interests of cheese importers would be served if all steamers catering for the cheese trade were so fitted. It is also the opinion of the signatories that even during the winter months it would be desirable to continue this system, as it is well known that heating in steamer's hold is caused by storage near other cargo, which has a tendency to create heat. The signatories would be glad if the committee of the Home and Foreign Produce Exchange would take the matter up, with a view to furthering the end suggested.'

'The importance of these representations will be appreciated from the fact that the memorial has been signed by practically all the London firms importing cheese.

'Now that the matter has thus been brought to your notice, I would urge that no effort should be spared to give effect to the wishes of the trade.

'Yours faithfully,

'JOHN D. COPEMAN,

'*Chairman.*'

OFFICERS TO OBSERVE HANDLING.

Several officers, in the capacity of inspectors, were appointed to observe and report upon the condition in which Canadian food products were loaded on the steamships at Montreal. During the season of navigation they reported that there had been 254 sailings of steamers of the following lines : Allan Line, Thomson Line, Elder-Dempster Line, Donaldson Line, the Manchester Liners and the Lord Line. The inspectors did not begin their work until early in June, and they reported on 204 of these sailings.

Four officers of the Department have been stationed at ports in Great Britain in connection with the extension and improvement of trade in Canadian farm products. They have been instructed to observe and examine carefully the manner in which

the products are handled in the unloading of the steamships for the purpose of enabling the Department to take such steps as may be necessary to prevent the damage, particularly to cheese and fruit, which has been complained of by shippers and receivers from want of effective cool ventilation on steamships. The want of care in unloading, in handling on the docks, and in carting to the railways and to warehouses, has in the past broken and injured a large percentage of the packages. The representations of these officers of the Department have contributed to the means which have brought about some improvement during the season.

VARIOUS FOOD PRODUCTS.

Inquiries and examination of Canadian cheese in several of the large commercial centres revealed the fact that much of it had been landed in the United Kingdom in a heated condition that told against it very greatly in the markets. Consumers are growing less and less willing to purchase anything except mild-flavoured and rich-bodied cheese for food. It is a matter of regret that while the general quality of Canadian cheese has been, on the whole, slightly improved during recent years, the improvement in the quality of the home-made cheese in England and the more exacting demands of the market have put Canadian cheese in a less favourable position in that market than it formerly held. The two matters which require to be remedied as soon as practicable, are the prevention of the heated flavour, by having the cheese cured and carried at a temperature continuously under 60 degrees, and the use of a quality of boxes which will carry the cheese safely and be delivered in the United Kingdom in an unbroken condition.

An investigation was carried on at two cheese factories in Canada in 1899, as to the effect on the quality of the cheese of curing them during the summer months in a controlled cool temperature continuously under 65 degrees Fahr. That was continued at one factory during 1900. It is evident that through the improvement of curing rooms at or for cheese factories, and by cool chambers in the steamships, it will be possible to deliver Canadian cheese in Great Britain with the flavour and quality as fine as those of the best English and Scotch makes.

When that is done, it is evident that the Canadian cheese trade, which under the present conditions appears to have passed its maximum, might continue to grow to at least twice its present volume, within the next ten years with prices no less remunerative to the farmers than they have been in the past.

There was a great development in the Canadian butter trade during the year. The number of packages carried in cold storage from the port of Montreal increased from 227,863 in 1900, to 410,893 in 1901. Canadian butter is winning a better relative place in the markets of the United Kingdom than it has occupied at any time hitherto.

Canadian brands of bacon, hams and pork, are now among the best known in the United Kingdom and the quality is winning for them a steadily growing demand. Some complaint has been made about the quality of some Canadian bacon. A little of it was complained of as being too fat, and a proportion of it as being somewhat

soft. Soft sides often fetch from four to eight shillings per hundred weight less than firm sides of similar weight and otherwise apparently equal quality.

It was learned from dealers in eggs that Canadian eggs were gaining in favour. The Canadian package is preferred to all others, and the Canadian eggs in size, condition and flavour are generally giving satisfaction. When the eggs were carried in cold storage on the steamships, the surface was so cold that moisture from the humid and warm air of Great Britain, was deposited on the outside of each egg. That brought about a 'mussy' condition and prevented the egg from keeping well. Consequently the importers prefer to have the eggs delivered in a cold condition to the steamship, and then carried in cool, ventilated chambers across the ocean. That leaves them with bright, dry shells when the cases are opened.

The Commissioner again reports to me that the superior qualities of Canadian flour for bread-making are not generally known by bakers or those who are directly interested. For sweetness, whiteness and strength, Canadian flour is unsurpassed. Independent analyses of various flours showed the quantity of albuminoids (flesh-forming principles in food) to be one-tenth greater in Canadian flour than in the flour imported into Great Britain from European countries. Canadian flour is generally used in these outside markets to which it is sent, by mixing with other flour to grade up the gluten strength of the latter, and so to improve the quality of the bread made from the mixture.

The export commerce of the country in most of the farm products is increasing at a very rapid rate. The following comparative statement of the value of the exports of some of the farm products of Canada during the years 1896 to 1901, shows the growth in that short period and indicates somewhat of the great possibility for further expansion of this trade :—

VALUE OF SOME CANADIAN FARM PRODUCTS EXPORTED IN YEARS 1896, 1897, 1898, 1899, 1900 AND 1901.

(Years ending June 30.)

——	1896.	1897.	1898.	1899.	1900.	1901.
	$	$	$	$	$	$
Wheat	5,771,521	5,544,197	17,313,916	7,784,487	11,995,488	6,871,939
Flour	718,433	1,540,851	5,425,760	3,105,288	2,791,885	4,015,226
Oats	273,861	1,655,130	3,041,578	3,268,388	2,143,179	2,490,521
Oatmeal	364,655	462,949	554,757	396,568	474,991	467,807
Pease	1,299,491	2,352,891	1,813,792	1,955,598	2,145,471	2,674,712
Cattle	7,082,542	7,159,388	8,723,292	8,522,835	9,080,776	9,064,562
Cheese	13,956,571	14,676,239	17,572,763	16,776,765	19,856,324	20,69 ,951
Butter	1,052,089	2,089,173	2,046,686	3,700,873	5,122,156	3,295,663
Pork, bacon and hams	4,446,884	5,871,988	8,092,930	10,473,211	12,803,034	11,829,820
Eggs	807,086	978,479	1,255,304	1,267,063	1,457,902	1,691,640

COLD STORAGE DIVISION.

Cold storage is intended to preserve commodities and thus avoid direct loss ; it is useful in extending the period during which they can be marketed ; and it thus gives the owners a wider chance to choose their own time for selling. The best service is for the preservation of commodities on their way to the consumers, and the less time they are on the way, as a rule, the better will be the ultimate results.

In the planning and carrying out of a system of cold storage for Canada, various interests had to be taken account of, viz. : the producers, the collecting buyers, the carriers or transportation companies, the distributing merchants and the consumers. The cold storage system has helped to prevent losses and deterioration of quality, it has given handlers a chance for more profit and left more wealth in the country. The arrangements were made mainly for cold storage for food products intended for export. Advantages have been provided incidentally for products for home consumption. With what is practically a chain of cold storage available, the superior quality of Canadian products will be further recognized by importing merchants and consumers in the countries to which they go.

COLD STORAGE ON STEAMSHIPS.

The contracts entered into with agents of steamship companies to provide a regular cold storage service for the carriage of butter and other perishable products from Montreal to points in Great Britain, in chambers cooled and kept cool by mechanical refrigerating machinery of the best and most modern sort, terminated at the close of navigation from Montreal in 1901.

From the port of Montreal, in the season of 1901, there were sailings of 24 steamers with cold storage, and most of these made several voyages each. The total capacity of those steamers per voyage to the various ports was as follows :—

	Cubic feet.
Bristol	128,154
London	104,807
Glasgow	46,044
Liverpool	38,846
Manchester	23,000
	340,851

In addition to these, the Allan Line had the steamship *Australasian*, which was originally fitted up for the Australasian frozen meat trade. She alone was reported as having cold storage capacity of 260,000 cubic feet.

Self-registering thermometers, called thermographs, were placed on the steamers of the different lines from time to time for the purpose of recording the tempertures at which perishable products were carried. These records show that butter was carried in cold storage at a temperature ranging from 26 to 30·4 degrees. A comparatively

small quantity of butter was carried in ordinary storage. The thermograph record for it shows that it was carried at a temperature of 71 degrees. Only small quantities of tender fruits and dressed meats were carried in cold storage during the season.

The following statement gives the number of packages of butter carried in cold storage, from the port of Montreal, during the seasons of navigation since 1898 :—

	Packages.
1898	209,172
1899	429,734
1900	227,863
1901	410,893

COLD STORAGE ON RAILWAYS.

Arrangements were continued for the running to Montreal of refrigerator cars fully iced from fifteen starting points on the Canadian Pacific Railway, from sixteen starting points on the Grand Trunk Railway, from two starting points on the Quebec Central Railway, from two starting points on the Intercolonial Railway, from six starting points on the Canada Atlantic Railway, and from one starting point on the Quebec and Lake St. John Railway. Six of these ran once a fortnight, the other thirty-six ran weekly.

The railway companies provided the refrigerator cars, and every car was iced to receive butter and other products requiring cold storage, at stations between the starting point and destination. Shippers who made use of these refrigerator cars were charged the regular 'less than carload rates,' and no extra charge was made to them for the cold storage services.

COLD STORAGE WAREHOUSES.

Cold storage warehouses of sufficient capacity for the trade are provided in Montreal as private business concerns. For the protection of perishable products intended for export and for the extension of business, it is desirable to have cold storage buildings at other centres. As the volume of trade at first would not likely be sufficient to induce business men to put up such buildings for the accommodation of products intended for export, a grant was offered to those who would provide cold storage buildings at central points. The grants were to be in the nature of guarantees that the earnings from the cold storage business at these points would yield at least 5 per cent on the cost of the buildings and plant.

The rates to be charged were to be satisfactory to the Department of Agriculture, and the grants from the government were not to be called upon, except to make up any deficiency between the net earnings and the sum of 5 per cent on the cost as mentioned. Advantage was taken of this offer at Quebec only.

An agreement was made with Messrs. B. and M. Rattenbury, the owners of a cold storage building at Charlottetown, P.E.I., to provide cold storage there for the use of the public at reasonable rates.

COLD STORAGE AT CREAMERIES.

To encourage the owners of creameries to provide cold storage accommodation at them to protect the butter in cold storage from the day after it is made, I caused it to be announced that the government would, subject to ratification by parliament, grant a bonus of fifty dollars ($50) per creamery for every creamery at which the owner would provide and keep in use a refrigerator room according to the plans and regulations, during the season of 1897 ; and further bonuses of twenty-five dollars ($25) per creamery for 1898, and of twenty-five dollars ($25) per creamery for 1899, if and when the refrigerator room was provided and kept in use according to the plans and regulations during these years.

Plans showing the style of construction to be adopted for the insulation of old cold storage rooms and the methods of constructing new cold storage buildings and ice houses were furnished on application.

When the bonus was made available for those years, a great many of the owners of creameries did not appear to understand the benefits which would result to themselves from providing cold storage ; and some did not learn of the offer of the government bonus in 1897 in time to construct the cold storage for use during that summer. To encourage the owners of creameries to provide the cold storage which is so necessary, I intimated that the government would extend the provisions of the bonus offered in the circular published October 26, 1896.

To the owners or lessees of creameries who did not before obtain the bonus of fifty dollars ($50), the government will grant a bonus of fifty dollars ($50) per creamery if and when its owner provides and keeps in use a refrigerator room according to the plans and regulations during the season of 1902, and the further bonuses of twenty-five dollars ($25) each for the seasons of 1903 and 1904, if and when the refrigerator room has been kept in use according to the regulations during these two seasons.

Thus the owner of a creamery who provides the necessary refrigerator room and keeps it in use according to the regulations during the three years ending 1902 or 1903 or 1904, as the case may be, may receive altogether a bonus of one hundred dollars per creamery.

The owners of nearly 500 creameries have provided cold storage in accordance with the regulations.

COLD STORAGE INSPECTORS.

Inspectors of cold storage visited creameries which had provided cold storage rooms through Ontario and Quebec. They also visited places where cold storage buildings were being put up for the protection of general food products of a perishable character. Another cold storage inspector, with headquarters in Montreal, inspected the refrigerator cars on their arrival, examined the cold storage chambers on steamships, and looked after any through shipments of butter or other perishable products intended for cold storage, when notified by the shippers to do so.

LIVE STOCK DIVISION.

The Live Stock Commissioner has been developing the policy of organization, and of diffusing information. In the North-west Territories, where organized efforts for the improvement of the live stock industry were particularly needed, a horse breeders' and a cattle breeders' association have been established under capable and energetic management. These associations have arranged and conducted the territorial auction sales of breeding stock. The Maritime Stock Breeders' Association has been strengthened and brought into closer touch with this Department. The educational work planned by this association includes a maritime winter fair, to be held at Amherst, N.S., in December, along the same lines as the Ontario provincial winter fair. The establishment of the maritime winter fair is very largely due to the fact that a number of the leaders of agricultural thought, including representatives of the local Departments of Agriculture, were brought by this Department to the Ontario winter fair at Guelph last year. There these gentlemen witnessed an exhibit of fine cattle, sheep, swine and poultry in Ontario, and listened to practical lectures by experts, with the living animals for illustrations in the first part of the programme, and with the dressed carcasses of the same at a later stage of the proceedings. All the men who are sent out by this Department to do farmers' institute work, are required to attend these fairs, that they may keep in touch with the illustrations and information given at them.

TO PROMOTE SALES OF STOCK.

For the purpose of bringing the buyer and seller of pure-bred stock into closer relationship, by providing a market for the animals produced by the smaller breeder and a convenient purchasing point for large or small buyers, a system of provincial auction sales has been established in connection with the local live stock associations of the several provinces. Such sales were held during the past year at Guelph and Ottawa, Ont., at New Westminster and Victoria, B.C., and at Calgary, Alta. A large number of animals were sold at these different sales, and usually at prices corresponding with their value. Preparations for similar sales for next year are now well under way in all of these provinces. The stock sold in British Columbia was nearly all purchased in the east on order of the British Columbia Dairymen's Association, which is making a determined attempt to improve the live stock of its province. The commissioner's visit to British Columbia last spring led to the opening up of a new line of live stock trade, viz., the shipping of stocker cattle from the eastern provinces to British Columbia to be fattened on the abundant pastures of the Pacific province for the home market in the mining districts and elsewhere. To show the possibilities of this trade, it is only necessary to mention that in 1900 less than $5,000 was paid for stock ordered in this way for the western trade, while in 1901 the amount has reached $25,000, and orders totalling some $25,000 or $30,000 more are in hand, to be filled before the end of the year. In order to promote this trade the railway companies have granted much lower freight rates than formerly prevailed ; and whereas a year or two ago it cost $360 to send a car of stock to British Columbia, stockers

are now carried in train loads at $175 per car, and pure-bred stock at $150 per single car.

AT THE PAN-AMERICAN EXHIBITION.

A creditable and successful exhibit of Canadian live stock was made during the summer at the Pan-American Exposition, held in Buffalo, N.Y., with the assistance of the Department. Five cows, each of the Ayrshire, Shorthorn, Jersey, Holstein and French Canadian breeds, were maintained in the model dairy competition at that exposition, with distinct credit to Canadian dairy interests. The prizes won in the general competition, whether in horses, cattle, sheep, swine or poultry, show that Canada was worthily represented.

TOWNSHIP FAIRS AND FARMERS' INSTITUTES.

An attempt has been made to improve the method of conducting county and township fairs, by sending out from the Department expert judges for the live stock classes, who explained to the exhibitors and to the spectators their reasons for placing the awards as they did. In this way it is hoped to make the judging an educational feature, instead of being merely an allotment of premiums by men who may be incompetent or biassed in their judgment. The new plan has proved so satisfactory in the Ottawa district, in the North-west Territories and in British Columbia, that a great extension of the system may be looked for next year.

Attention has been given to the establishment of well organized farmers' institute systems in the various provinces. British Columbia has taken up this work with vigour, and now has an organization covering most of the agricultural districts of the province. One series of meetings was held in the spring and another in the fall. At each meeting addresses were given by trained and capable institute speakers sent out by this Department. Two of these men also attended a number of meetings, held in connection with the Department of Agriculture of the North-west Territories, while four others conducted a summer campaign in Manitoba. New Brunswick and Prince Edward Island have been well organized for institute work, and have lately held a number of successful meetings, with the assistance of lecturers sent them from here by this Department. Series of meetings have been held in the eastern townships of Quebec, with excellent results, and it is expected that a well organized system of institutes will soon be in operation in that province. Special institute meetings, devoted entirely to the horse-breeding interests, are now being arranged for in some of the provinces.

Nearly all the important live stock record associations doing business in Canada have been incorporated under the Act of Parliament passed in 1900, and the work of these associations is now under the supervision of this Department.

Press bulletins on live stock matters are now being sent out weekly to newspapers in Canada, and it is intended in the future to issue regularly bulletins dealing each

with some phase of the live stock industry. A bulletin of this class, a directory of the breeders of pure-bred live stock in the Dominion of Canada, with data regarding each stud, herd and flock, has been distributed.

The months of June and July were spent by the Live Stock Commissioner in Great Britain, where he made a study of the methods of live stock management prevailing there, of the markets for live stock, and of the plans used in conducting large fairs and auction sales.

FATTENING OF CHICKENS.

An investigation was made in 1898 of the method followed in Great Britain for the special fattening of chickens. I authorized in that year the establishment of two chicken-fattening stations to test the process of fattening in Canada and to illustrate how it could be applied. Trial shipments of these fatted chickens were forwarded to Liverpool and London. The reports received state that the poultry arrived in fine condition, pleased the trade well in every respect and were sold at good prices. In 1899, eight additional illustration stations were established, and the reports indicated that there was an opening for a very large trade. The fatted chickens arrived in good condition, pleased the consignees and were sold at relatively good prices.

Last year the number of stations was increased and a series of experiments conducted to ascertain if the process of fattening the chickens could be more profitably conducted by fattening the chickens in pens on the ground. This was found not to be the case. The chickens in the fattening crates made more gain in weight for the same period, and had a better quality of flesh than the chickens fed loose in the pens. The further investigations and the shipments of the chickens to Great Britain confirmed the expectation that this branch of production could be extended with much profit. Private concerns throughout Canada have sent forward large shipments of chickens which I learn have arrived in a satisfactory condition.

This year I authorized the establishment of three stations for the artificial hatching, rearing, and fattening of chickens. The eggs at these stations were purchased from farmers and hatched by incubators. The chickens were reared in outdoor brooders and when four months old were placed in the fattening crates. They were then fatted for another month and shipped to Great Britain.

The illustrative fattening stations were continued and the quality of the chickens exported to Great Britain since 1898, has steadily improved.

This year further shipments of chickens by commercial firms have gone forward with success to Great Britain, under the direction of this Department. Large concerns are rapidly developing the business by buying live fatted chickens from the farmers, and giving attention to the killing and marketing of the same.

I learn that on Canadian markets higher prices are being paid for fatted chickens than for the ordinary lean chickens, so that fattening the chickens has become a profitable business for the farmer, whether catering for the home or foreign market.

DAIRY DIVISION.

NORTH-WEST TERRITORIES CREAMERIES.

The Department of Agriculture continues to manage the creameries in the North-west Territories. There were in operation during 1901, twenty creameries with several contributory skimming and cream collecting stations. As a result of the past season's business seven more of these creameries have, through the assessment of one cent per pound of buter, repaid the loans which were made to them by the government when the arrangement was entered into, in 1897-8.

The output of the largest creamery was 121,419 pounds of butter, being an increase of 56,000 pounds over the make of 1900.

There was a balance of revenue from the manufacturing charge of four cents per pound of butter, at several of the creameries, over the expenditure for operating and maintaining them. Any such balance in the manufacturing account is credited to the loan fund of the creamery concerned, and when the indebtedness to the Department has been paid, the balance is put to the credit of the patrons of the creamery.

A large proportion of the butter is marketed in British Columbia. A limited quantity is sent to China and Japan and also to the Yukon.

During the past season, about 200,000 pounds were forwarded to Montreal for export to Great Britain. That course left the markets of British Columbia and the west more open to handle butter from Manitoba and other butter from the North-west Territories than they would have been otherwise. A portion of it was not as suitable for export as the butter from the government creameries. The refrigerator car inspector at Montreal reports the butter from the government creameries as having arrived there after a journey of 2,000 miles by rail in better condition than other butter coming less than 100 miles, thus demonstrating the practicability of successfully shipping butter from the far west to England.

Four of the creameries in Alberta were operated during the winter of 1900-1901. In addition to these there will be one in Assiniboia running during the winter of 1901-1902.

CREAMERIES IN NOVA SCOTIA.

Besides the dairy station at Nappan, the Department operated two other creameries in Nova Scotia. These were built and equipped by joint stock companies of farmers themselves, one at Scotsburn and the other at Mabou. The Department charges 3½ cents per pound of butter for manufacturing and marketing. The patrons deliver the milk or cream to the creamery at their own expense.

A considerable portion of this butter is put up expressly for the West Indian trade.

The Dairy Superintendent for the maritime provinces attends organization meetings, farmers' institutes, visits cheese factories and creameries and gives advice to dairymen generally.

OFFICIAL REFEREE FOR BUTTER AND CHEESE AT MONTREAL.

It gave me pleasure to be able to comply again with requests from representative salesmen of butter and cheese factories, supported by the leading buyers and exporters of dairy products in Montreal, and to arrange for an official referee for butter and cheese at that port. His duties are to examine any butter or cheese about the quality of which there may be a difference of opinion or dispute between the seller and the buyer.

The official referee reports having examined, during the past season, upon request, 1,924 lots of cheese and 229 lots of butter. Of this number, 83 lots of cheese and 7 lots of butter were pronounced by him as 'finest' quality in opposition to the opinions held by the buyers. In those cases the butter and cheese were accepted at full prices, after the referee had given his decision. A report on the quality of each shipment examined is sent to the representative of the factory, and a copy is given to the buyer. The referee, being an experienced cheese and buttermaker, is often able to point out to the makers of the cheese or butter in question how the defects in the quality may be remedied.

GENERAL DAIRYING SERVICE IN THE PROVINCES.

In the province of Quebec, the Assistant Dairy Commissioner has attended and addressed a large number of public meetings. He has also given a series of lectures to the students of each course at the St. Hyacinthe Dairy School.

In British Columbia, classes of instruction in buttermaking were held at four points, covering a period of a week to ten days in every case. Public meetings for the discussion of general dairying questions were held in connection with these classes. The instructors visited the creameries that are in operation in the province.

The Chief of the dairy division and his assistants have attended a large number of meetings and conventions of dairymen in the various provinces. They have also acted as judges of dairy produce at many of the leading fall exhibitions. An instructor is to be provided to assist in holding a class in cheesemaking and milk testing at Charlottetown, Prince Edward Island. The Dairy Superintendent for Nova Scotia acted as one of the instructors at the Sussex, N.B., Dairy School during its last term, and the offer of an instructor has been renewed for another year.

Several bulletins and leaflets have been issued during the year giving information upon the production and handling of milk, the manufacture of cheese, the improvement of cheese curing-rooms, &c. These publications have been freely distributed among the patrons and managers of cheese factories and creameries. A large number of technical inquiries are answered relating to the organization, equipment, and the management of cheese factories and creameries, the manufacture of cheese and butter, the testing of milk, &c. Much useful information is in this way disseminated.

BRANDING AND REGISTRATION BILL.

Under the Act passed 'to provide for the Registration of Cheese Factories and Creameries, and the Branding of Dairy Products, and to prohibit misrepresentation as to the dates of Manufacture of such Products,' certificates of registration have been issued to 1,109 cheese factories and creameries, and applications are being received occasionally.

EXPORTS OF BUTTER AND CHEESE.

The magnitude and growth of the export trade of Canada in dairy products is shown by the following tables (years ended June 30) :—

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

Year.	Quantity.	Value	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1869.....	10,649,733	1,698,042	534,707	1,015,702	.....	1,496	14,870	95,777	26,986
1880.....	18,535,362	3,058,069	2,756,064	111,158	.....	.....	24,710	163,290	2,647
1890.....	1,951,585	340,131	184,105	5,059	.....	.....	29,342	119,989	1,636
1891 ...	3,768,101	602,175	440,060	10,054	.....	20,447	24,021	101,649	5,944
1892	5,736,696	1,056,058	877,455	6,038	.....	5,160	27,207	133,770	6,428
1893	7,036,013	1,296,814	1,118,614	7,539	. ....	1,175	35,042	127,412	7,032
1894.....	5,534,621	1,095,588	936,422	6,048	1,125	.....	25,560	109,263	14,170
1895.. ...	3,650,258	697,476	536,797	5,365	.....	267	35,028	108,439	11,580
1896.	5,889,241	1,052,089	893,053	2,729	.....	9,370	34,299	105,472	7,166
1897.	11,453,351	2,089,173	1,912,389	6,233	.....	8,513	33,490	115,754	12,794
1898	11,253,787	2,046,686	1,915,550	3,738	.... ..	17,574	31,619	51,045	27,160
1899.....	20,139,195	3,700,873	3,526,007	3,984	.....	12,384	41,810	74,813	41,875
1900.....	25,259,737	5,122,156	4,947,000	5,044	.....	7,210	43,176	66,069	53,657
1901.....	16,335,528	3,295,663	3,142,353	5,839	....	.....	39,675	44,986	62,810

CHEESE.

Year.	Quantity.	Value.	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lbs.	$	$	$	$	$	$	$	$
1868	6,141,570	620,543	548,574	68,784	....	.....	891	1,954	340
1880	40,368,678	3,893,366	3,772,769	114,507	... .	.....	170	5,710	210
1890	94,260,187	9,372,212	9,349,731	6,425	.....	370	2,154	12,777	755
1891	106,202,140	9,508,800	9,481,373	13,485	.....	... .	1,954	9,104	3,884
1892	118,270,052	11,652,412	11,593,690	39,558	2	.....	2,124	12,942	4,096
1893	133,946,365	13,407,470	13,360,237	23,578	....	.....	2,689	18,679	2,297
1894.... .	154,977,480	15,488,191	15,439,198	9,552	.....	173	3,036	21,948	14,284
1895	146,004,650	14,253,002	14,220,505	5,058	.....	16	5,463	9,785	12,175
1896	164,689,123	13,956,571	13,924,672	10,359	299	.....	4,861	7,509	8,871
1897	164,220,699	14,676,239	14,645,859	4,486	94	24	5,365	11,954	8,457
1898	196,703,323	17,572,763	17,522,681	14,604	.....	1,428	6,889	12,784	14,377
1899	189,827,839	16,776,765	16,718,418	17,739	.....	....	11,701	13,293	15,614
1900 . ..	185,984,430	19,856,324	19,812,670	4,836	.....	.....	8,774	16,651	13,393
1901 ..	195,926,397	20,696,951	20,609,361	37,601	465	12	15,375	16,603	17,534

IMPORTS OF GREAT BRITAIN.

The following table from the Board of Trade returns of Great Britain for ten years (ended December 31), shows the total quantities and value of butter and cheese imported into Great Britain :—

BUTTER.			CHEESE.		
Year.	Quantity.	Value.	Year.	Quantity.	Value.
	*Cwt.	£ stg.		*Cwt.	£ stg.
1890	2,027,718	10,598,848	1890	2,144,074	4,975,134
1891	2,135,607	11,591,181	1891	2,041,317	4,815,369
1892	2,183,009	11,965,190	1892	2,232,817	5,416,784
1893	2,327,474	12,753,593	1893	2,007,462	5,160,918
1894	2,574,835	13,456,699	1894	2,226,145	5,474,940
1895	2,825,662	14,245,230	1895	2,133,819	4,675,130
1896	3,037,718	15,344,364	1896	2,244,525	4,900,342
1897	3,217,802	15,916,917	1897	2,603,178	5,885,521
1898	3,209,153	15,961,783	1898	2,339,452	4,970,805
1899	3,389,851	17,213,516	1899	2,384,069	5,503,004
1900	3,378,516	17,450,435	1900	2,705,878	6,837,883

*Cwt. = 112 lbs.

FRUIT DIVISION.

FRUIT MARKS ACT.

An Act to provide for the marking and inspection of packages containing fruit for sale came into operation on the 1st day of July, 1901. Section 16 conferred power on the Governor in Council to make such regulations as he considers necessary in order to ensure the efficient enforcement and operation of the Act. In that connection an Order in Council was passed, as follows :—

'Whereas by section 16 of the Act 1, Edward VII., chapter 27, intituled 'An Act to provide for the Marking and Inspection of packages containing Fruit for Sale,' it is provided as follows :—

"16. The Governor in Council may make such regulations as he considers necessary in order to secure the efficient enforcement and operation of this Act ; and may by such regulations impose penalties not exceeding fifty dollars on any person offending against them ; and the regulations so made shall be in force from the date of their publication in the *Canada Gazette* or from such other date as is specified in the proclamation in that behalf ; and the violation of any such regulation shall be deemed an offence against this Act and punishable as such."

'Therefore His Excellency the Governor General in Council is pleased, in virtue of the above cited provisions of the said Act, to make the following regulations, the same to come into force on the date of their publication in the *Canada Gazette.*

'1. The Minister of Agriculture may make appointments of inspectors and other persons for the enforcement of the Act.

'2. Any inspector charged with the enforcement of the Act may detain, for the time necessary to complete his inspection, any shipment of fruit, in respect of which he has reasonable grounds for believing that the marking of the package or the packing of the fruit constitutes a violation of the Act ; such fruit shall at all times be at

the risk and charges of the owner thereof ; and any inspector detaining fruit shall give the owner, where ascertained, notice that such fruit is being detained, in storage or otherwise, as the case may be.

'3. The despatch of a prepaid telegram or letter to the packer whose name is marked on the package shall be considered due notice.

'4. No person shall, for himself or on behalf of any other person, pack any fruit for sale, contrary to the provisions of the Act.

'5. Any inspector or other person who violates any of the regulations made under the authority of the Act shall for each offence on summary conviction, be liable to a fine of not less than five dollars and not exceeding fifty dollars, together with the costs of prosecution.'

A number of inspectors have been appointed to enforce the Act. Results are already apparent in the general adoption of a more businesslike system of marking packages, and in the improvement shown in methods of packing. The encouragement given by the Act to those who ship choice fruit, by preventing the sale of inferior grades under false designations, will doubtless lead to more careful grading of fruit ; and this in turn will bring about the establishment of a high reputation for the best quality of Canadian fruit, especially in foreign markets.

CROPS.

RESULTS OF THE PAST SEASON.

During the past season Canadian farmers have been blessed with fairly good crops in most parts of the Dominion, and with especially good returns in the greater part of the western portions of the country.

Ontario.

In Ontario, the hay crop has been remarkably good, both as to quantity and quality, and most of it was well saved. In the early spring months the rainfall was considerably greater than the average of past years, while later in the season the weather was unusually hot and dry. These conditions were favourable for the hay crop, but more or less unfavourable for the grain.

Winter wheat suffered much injury from the Hessian-fly, which ravaged the fields, particularly in the western parts of the province. Rust also injured the grain to some extent. Owing to these unfavourable conditions, the crop was much reduced in volume and the grain was more or less shrunken and light in weight. In the eastern counties the returns from winter wheat have been more satisfactory.

Spring wheat has given nearly an average crop. In some districts the yield has been fairly good ; in others, owing to drought, it has fallen lower. Most of the grain, however, is plump and full. Barley, also, is about an average crop.

Oats, which is much the largest and most important grain crop grown in Ontario, occupying a larger area than wheat and barley combined, fell below the average of past years, while the quality is not up to the usual standard. This may be accounted for by the rapid ripening of the grain, owing to the unusual heat and drought in July, which in many cases prevented the heads from filling properly. In the eastern parts

of the province, where the conditions were more favourable, the oat crop has been better.

The pea crop has been comparatively light. In some parts it has been injured by the 'weevil,' and in other sections by rain and heat.

The hot summer weather was favourable for Indian corn, which has now become one of the staple fodder crops of Ontario. This crop has matured well and has given more than an average return.

Field roots have given a satisfactory yield. Potatoes, also, have given a crop above the average.

The apple crop in Ontario has been disappointing. Wet weather set in about a week before the blossoming period and prevailed for several weeks, and, although there was plenty of bloom on the trees, a very small proportion of it set. In some of the northern parts of the province the yield was better, but taking the province as a whole, the crop fell much below the average. Pears have yielded well and the crop of plums in some sections was heavy.

Among the small fruits, strawberries gave an abundant crop. Raspberries, however, suffered from injury to the canes in the winter, and from drought during summer, and consequently gave a poor return. Grapes, in most districts, have given a satisfactory yield.

Quebec.

In the province of Quebec the yield of hay has been unusually good and the crop was saved in excellent condition. The weather has been more favourable for the oat crop, also, than it was in Ontario, although the returns on the whole are said to have been somewhat below the average. Wheat and barley are reported as having given about the usual return, while pease have fallen somewhat below the average.

There has been an excellent growth of grass and meadows have given good pasturage, and the stock and dairy interests are prospering. In many districts the crop of fodder corn has been excellent and has matured well, while field roots in most localities have given encouraging returns. The crop of potatoes, however, has been somewhat below the average of past years.

The varieties of apples and other fruits grown chiefly in the western counties of this province have given lighter crops than usual; but prices have been high and the return correspondingly encouraging.

Maritime Provinces.

In the maritime provinces the season has been a fairly satisfactory one. The spring opened earlier than is commonly the case, and was unusually wet, so much so that seeding was very much delayed, while later in the season the weather was unusually warm and dry.

Hay has been an exceptionally heavy crop, particularly on the uplands, and most of it has been saved in good condition. Oats, barley and wheat all promised well until

near harvest time, when continued dry and warm weather caused these crops to ripen up so rapidly that the grain in some places gave a lower yield than was anticipated, but in other localities the results were satisfactory. On the whole, however, the yield of grain is said to have fallen somewhat short of the average; but this falling off has at least some compensation in higher prices. Very late sown grain, in most instances, gave poor returns.

The Indian corn crop was unusually good and matured well. Field roots, also, have given fairly good returns. Owing to the warm and dry weather in August, the growth of grass and clover has been much less than usual, hence cattle are not in quite so good a condition as last year and dairy animals have not given the quantity of milk they usually do in this cool and moist climate, generally so favourable for dairying and stock raising.

The apple crop has been a medium one, but owing to the high prices prevailing, growers are getting very satisfactory returns. The season has been noted for producing apples a large proportion of which are of good quality. The yield of plums was very good, but the returns from cherries and pears were not so encouraging. The strawberry crop was better than the average; other small fruits gave less satisfactory returns.

Manitoba.

In Manitoba the season opened early in April, but seeding was interrupted about the middle of the month by a snow-storm ; nevertheless, sowing was finished in good time. . The rainfall during the growing months was above the average and the weather was very favourable for growth. August was dry and free from frost and all grain was harvested in good condition. The crops were much heavier than any hitherto harvested in Manitoba, and while showery weather late in September and early in October was unfavourable for stacking and threshing, and much of the wheat was somewhat bleached and consequently lowered in grade, the returns on the whole have been highly gratifying. This excellent harvest should prove a great impetus to farming in that part of the country and give a stimulus to business in all departments.

North-west Territories.

In the North-west Territories the spring season was backward, with cold and showery weather; hence, seeding was later than usual. Fine weather following, growth was very rapid and strong and the hay crop remarkably heavy. During June and July the rainfall was unusually large, which resulted in a very heavy growth of all crops. August was dry, with favourable weather for the ripening of cereals, and by the end of the month the harvest was almost completed. The yields of grain, particularly in Eastern Assiniboia, have been extraordinary and much in advance of any previous records. The Director of the Experimental Farms, who visited the North-west under my instructions about harvest time, described the appearance of the grain fields as marvellous and exceeding in promise anything he had ever seen before, while the area under crop was very large.

The threshing has given results in advance of what was anticipated and the returns received by individual farmers are highly encouraging. Following the harvest, there were rain-storms at intervals of some weeks, which interfered much with the stacking and threshing of wheat. This resulted in the bleaching of the grain in the stook, and consequently in depreciation in grade ; but the loss from this cause will not be sufficient to materially lessen the large profits which farmers will make from their crops this year in that favoured district. Oats and barley, although less important crops there, have given wonderful yields.

In Saskatchewan also, the growth has been remarkable, and the grain crops very large. In this section, stock-raising forms an important element in farming, and the great growth has given an abundance of fodder, which farmers can profitably use in connection with this part of their business.

Under my instructions, the director also visited southern Alberta, where the stock industry has been rapidly developed. He reports very satisfactory progress in this direction. In some of the drier portions of the country, where irrigation has been introduced, settlement has progressed very rapidly, and the newcomers have had good crops. The recently constructed irrigation ditches, extending for over one hundred miles, bring the mountain streams out on the drier plains, and permit of the irrigation of the crops over a very wide area. Towns are springing up, and growing rapidly, along the line of the main irrigation ditches, a large area, including many thousands of acres, has been under crop during the past season, and the returns have been very satisfactory.

British Columbia.

In the coast climate of British Columbia, the season has, on the whole, been a very favourable one for hay, grain and root crops. Oats, wheat and barley have given unusually heavy returns, much above the average. Field roots and fodder corn also gave remunerative crops, while the yield of potatoes was very large.

The season in this part of British Columbia has not been favourable for fruits. The early part of the spring was wet and cold and the fruit did not set well, and a light frost in April, when the fruit was well advanced, injured the crop considerably, so that the results were disappointing.

In the drier portions of this province in the interior the fruit crop was an excellent one. Here the apples, pears and plums were very fine and brought good prices in the mining districts also in Manitoba and the Territories. Other crops were also good in the interior of the province.

CATTLE TRADE FOR YEAR ENDED SEPTEMBER 30.

IMPORTATION OF LIVE STOCK.

The importation of horses and mules, cattle, sheep and swine into the Dominion reported during the past season was as follows :—

Horses and mules	10,935
Cattle	8,478
Sheep	88,639
Swine	146

The above were brought in at various points as shown in detail in the reports of the Chief Veterinary Inspector (See Appendix No. 13).

EXPORTATION OF LIVE STOCK TO EUROPE.

The exportation of live stock from Canadian ports for the year ended September 30, 1900, was as follows :—

Horses	3,222
Cattle	117,688
Sheep	73,184
Swine	Nil.

EXPORTATION OF CATTLE TO THE UNITED STATES.

The number of Canadian cattle exported to the United States during the past six years, was as follows :—

1896	1,646
1897	57,857
1898	88,605
1899	85,240
1900	86,898
1901	46,244

EXPERIMENTAL FARMS BRANCH.

Fifteen years of steady, practical work, covering all branches of agriculture, horticulture and arboriculture, have given ample demonstration of the great usefulness of these Dominion institutions to farmers in every part of Canada. Object lessons of the most convincing character have been presented to the many thousands of farmers who have visited these farms in person and the visitors have carried away with them information which has been put to practical test on their own farms with the result of increased profits in their business. To the larger farm population, made up of those who have not the opportunity of visiting the Experimental Farms, the excellent reports prepared by the several officers of these institutions are available, being freely sent to all who ask for them. Thus, the information gathered is being very widely distributed. Fifteen years ago farming was conducted in a very different way from what it is at present, and the farmer occupied a much inferior position in the estimation of his fellows. Since then, his knowledge of his business has been greatly advanced and his material prosperity correspondingly increased. The Experimental Farms were among the first agencies established for the improvement of farming and the great strides which have been made along all the lines comprised in this national industry owe much to the sound principles on which the

work of these farms was based and to their consistent demonstration and advocacy of the best methods.

The necessity of a thorough preparation of the soil for crop, varying in its character to suit the different climatic conditions in the Dominion—the advantages of early sowing—the economy of using barn-yard manure, as far as practicable, in a fresh or unrotted condition—the increase to the fertility of the land brought about by the ploughing under of crops of green clover—have all been presented many times over and proven in the most convincing manner. Ample demonstrations have been made as to the inherent vigour of certain strains of seeds resulting in greater productiveness. The importance of selecting for seed such larger yielding sorts has been repeatedly shown and the results which have been had, in larger crops by the choosing of such sorts, have awakened a great interest in the subject in the minds of intelligent farmers all over the country, and many have been induced to follow the teachings and example of the Experimental Farms with the best results.

IMPROVEMENT OF SEED.

The systematic testing of promising varieties of agricultural crops obtainable in different parts of the world has been continued and the results of these tests, which show the relative positions occupied by these new sorts as to cropping power, are given from year to year in the publications of the Experimental Farms. Varieties which prove of special promise after being tested at the several farms, are grown on larger areas and the seed thus obtained distributed freely among farmers in all parts of the country. In this way the farmers of the Dominion are put in possession of the very best and most productive varieties of seed grain, pure and true to name, at no cost to themselves beyond the labour of looking after the growing of the seed. For the past six years more than 30,000 farmers have participated annually in these co-operative tests, about sixty tons of seed being yearly distributed for this purpose. This work has had a wide educational effect. It has placed Canadian farmers in the van as to knowledge of the best and most productive sorts of agricultural products. They have learned to observe the characteristic differences in varieties, and their powers of observation and comparison thus awakened, they have been led to bring these faculties to bear on other problems in their business, to their individual advantage and profit. Their neighbours, in turn, have become interested in this work, and have benefited thereby, and the good influence has thus been rapidly extending through all sections of the farming community.

The new feature in this annual distribution introduced, under my instructions, three years ago, has made this work increasingly beneficial. Under this new arrangement, larger samples than those hitherto sent have been forwarded, the seed sent out being sufficient for one-tenth of an acre. In this way the relative yield per acre of the varieties under trial has been ascertained and reported on by practical farmers in every agricultural constituency in the Dominion.

NEW FRUITS FOR THE COLDER SECTIONS OF CANADA.

Further results have been had with cross-bred seedling crab apples, which have shown themselves hardy enough to endure the unfavourable climatic conditions of

winter in the North-west country. From the new sorts which have fruited during the past season, additional promising varieties have been chosen which will be propagated for further distribution.

PAN-AMERICAN EXPOSITION, BUFFALO, N.Y.

A very comprehensive and attractive exhibit of agricultural products was prepared by the Experimental Farms for the Buffalo Exposition. This was displayed in the Canadian building, where it almost filled the central court. Grain in the straw formed a prominent feature in this exhibit, and the fine, well matured heads, with long and bright straw, especially of that from the Experimental Farms at Brandon, Man., and Indian Head, N.W.T., all artistically arranged, were much admired. Large collections of all the best varieties put up in small bunches, labelled and shown under glass, formed a very instructive feature in this exhibit. Large numbers of different sorts of cereals of very fine quality were shown in glass jars of different sizes, tastefully arranged on stands. A general display was made of many other sorts of agricultural products, including a good collection of the more important grasses grown in Canada. A fine exhibit was made of the honey produced at the apiary of the Central Experimental Farm. The Canadian agricultural display was generally admitted to be the finest exhibit of the kind on the grounds.

GLASGOW EXHIBITION.

Considerable quantities of grain, both cleaned and in the straw, were also sent forward to Glasgow from the Experimental Farms. These exhibits formed a very attractive feature. The high quality of the grain and the brightness of the straw were the subject of many favourable comments by visiting farmers from all parts of Great Britain and the continent. Later in the season, a fine representative collection was sent forward of many sorts of grain from the several Experimental Farms, the growth of 1901. These exhibits reached Glasgow in good condition and in time to be shown for several weeks before the close of the fair. They were displayed in a separate group and attracted much attention.

Acting on my instructions, the Director of the Experimental Farms brought together an excellent collection of fresh fruits, chiefly apples, grown in 1900, which were kept in cold storage in Canada until early in the spring of 1901, then shipped to Glasgow in cold storage, and stored under like conditions there. These fruits which consisted chiefly of our best commercial varieties of apples, were shown in a fresh condition during the whole period of the exhibition, being renewed from time to time as they became shrivelled or decayed from exposure and in this way an excellent display was maintained to the end. The superior characteristics of Canadian apples were thus brought prominently under the notice of a vast number of people who visited this notable exhibition.

CENTRAL EXPERIMENTAL FARM—DIVISION OF AGRICULTURE.

The farm proper, consisting of about two hundred acres of arable and pasture land, is under the immediate supervision of Mr. J. H. Grisdale, who is likewise in charge of all animal husbandry and dairy work conducted thereon.

The work in field agriculture during the past year has been along several lines, the (*a*) study of rotations, (*b*) testing of methods of cultivation, and (*c*) determination of cost of production of digestible dry matter in different forms being the chief.

Some valuable data alongs these lines have been secured, a full report of which may be found in the Agriculturist's part of the Experimental Farms report for 1901.

In animal husbandry experiments have been, and are being, conducted to ascertain the values of different feeding stuffs, both coarse and concentrated, for the production of milk, beef, mutton, and pork. An effort is being made also to gain some information as to the comparative economy of feeding rations of narrow and wide nutritive ratios for the production of milk, and to ascertain their influence upon the quality of the milk produced. A series of experiments, having in view the determination of the influence of time of milking upon the quantity and quality of milk produced by cows, has just been concluded. The results are interesting and conclusive.

With steers, a number of experiments under way are for the purpose of ascertaining the comparative economy of feeding aged animals (3 year olds) loose and tied, of feeding calves, yearlings, two year olds, or three year olds. The above is in addition to a study of economy of feeding well from birth to block, as contrasted with feeding sparingly till the animals is two years old, then finishing of for shippers.

With sheep, work has been done to ascertain the best conditions for the production of good mutton carcasses by breeding, as well as by feeding, it being well known that both factors enter materially into the results.

In pork production, the investigations have been along the lines of economy of different grain and pasture or roughage feeding stuffs, and the effect of these feeds upon the quality of the finished product.

A large number of pure bred, imported animals have been added to the herds and flocks. They are as follows : Shorthorns, 3 cows, 2 heifers, 1 bull calf, 1 cow calf ; Ayrshires, 1 bull, 4 cows, heifers ; Guernseys, 4 cows, 1 calf.

Sheep : Shropshire, 1 ram, 5 shearling ewes, and 4 ewe lambs. Besides the above, 1 Yorkshire sow, 1 Tamworth sow, 1 Berkshire boar and 1 sow, 2 large black boars and 2 sows. This is the first importation of pigs of this latter breed into Canada.

DIVISION OF HORTICULTURE.

In the Horticultural Division are included the fruits, vegetables and tobacco, the arboretum and botanic garden and forest belts. The principal experiments with fruits are to determine the hardiness, productiveness, quality and freedom from disease of the different varieties ; but experiments in various methods of propagating, grafting and cultivating are also conducted. Experiments are also carried on in the orchard with cover crops, which are very useful in preventing injury to the roots of trees during winter. The investigation and treatment of diseases of fruits are also undertaken by this division.

Fruits.—Owing to wet weather during blossoming season this year, which prevented proper fertilization of the flowers, the crop of fruit was not so large as it would otherwise have been. The winter, also, was severe throughout this district, and while some fruits did not suffer much, the raspberry crop was practically a failure, the canes having been badly winter-killed. Notwithstanding the unfavourable winter and spring, a number of varieties fruited which had not done so before, and careful study was made of them. The data accumulated from year to year are very valuable, making it possible to recommend certain varieties with fair likelihood of success. There has not yet been found a hardy late keeping dessert apple of the best quality suitable for Ottawa and similar eastern and northern climates, which would compare with the most valuable apples in the best apple districts. In order to try and obtain such an apple, a seedling orchard was planted at the Central Experimental Farm last spring, comprised of seedlings raised from seeds of the best apples ripened at Ottawa. It is hoped that from these a suitable variety will be originated. As the European and Japanese varieties of plums do not succeed well at Ottawa, special attention is paid to the American plums, and a large number of these are being tested. Seedlings are also being grown and some of those which have fruited have proved of much value.

A bulletin on apple culture was published by this division this year, for which there has been a large demand.

Spraying.—The fruit trees were sprayed this year as usual and the results were, on the whole, good, there being practically no spot on the apples. The potato crop in the Ottawa valley was light this year, having suffered from wet weather in the summer and from blight and rot in the autumn. An experiment conducted to demonstrate the value of spraying with Bordeau mixture for the prevention of blight on potatoes gave very marked results and showed the necessity of this work, especially in a season like the last.

Forest Belts.—The various plantations which comprise the forest belts are most of them doing well, but here and there where a species has not found suitable soil the trees are not making as rapid growth as they otherwise would. In some places where the trees had not succeeded new plantations were made and different methods of planting adopted. The measurements of the growth of the most important timber trees in the belts were again taken this year.

Arboretum and Botanic Garden.—The educational value of the arboretum and botanic garden is increasing year by year, and, this season being favourable for vigorous growth, nearly everything looked well. The hardiness and growth of the different species and varieties are recorded each year, and a large amount of useful information is thus obtained.

DIVISION OF ENTOMOLOGY AND BOTANY.

The year 1901 has been no exception to the general rule in the constant demand for information from the Entomologist and Botanist and his assistants. During the year over 3,000 letters have been received from farmers and others concerning injurious insects, weeds, and allied subjects. The investigations of the life-histories of many injurious and beneficial insects have been paid special attention to, and the

study of the improvement of remedies has been advanced considerably. The collections of insects and plants in the division have been materially increased, and their arrangement for exhibition to visitors is progressing rapidly. A large number of cases are now in order and have proved a great attraction, not only to farmers, but to students of natural history and the scholars of the public schools.

The experimental grass beds have been a constant source of interest, particularly to the large number of agriculturists attending the various excursions during the summer. Many farmers' institute and other agricultural meetings have been addressed by the Entomologist and Botanist, on subjects within the scope of his division, the useful information thus given proving acceptable to the hearers, and at the same time a good opportunity is taken advantage of for bringing the use of the important work of the division before the farmers.

In July last, at the invitation of the Department of Agriculture for Manitoba, the Entomologist and Botanist proceeded under my instructions to that province to investigate and give advice concerning a rather serious outbreak of locusts. This outbreak covered a portion of the country infested in 1900, but extended to other localities not then affected. The true Rocky Mountain locust was found in one or two places. Perhaps the most widely distributed and destructive species was the Lesser Migratory locust. The Pellucid locust and Packard's locust were also present in large numbers, together with several others of less importance. Remarkably satisfactory results were secured by those who were wise enough to make use of the remedies recommended through the Provincial Department of Agriculture, and a most useful modification of the poisoned bran remedy was devised by Mr. Norman Criddle, of Aweme, by which fresh horse droppings, which were noticed to be particularly attractive to locusts, were substituted as the vehicle for distributing the poison instead of bran, which of course costs money and is more difficult to obtain. This proved to be an exceedingly attractive and fatal bait, by which the crops were effectively protected.

From Manitoba the Entomologist and Botanist at the request of the government of the North-west Territories, held in conjunction with Mr. Angus Mackay, the Superintendent of the Indian Head Experimental Farm, a series of farmers' meetings along the Edmonton branch of the Canadian Pacific Railway. These meetings were very successful, both with regard to attendance and to the interest evinced.

In view of the extensive depredations of the Variegated Cutworm in British Columbia in 1900, and the anxiety as to the possible recurrence of this insect, I instructed the Entomologist and Botanist, at the request of the provincial government, to visit some of the localities where loss from this insect had been most complained of. Consequently, investigations were made and meetings of farmers were held during the month of August at several points in British Columbia. As was anticipated in the exhaustive article on the Variegated Cutworm, published in the Experimental Farm Report for 1900, there was no destructive occurrence of the species this year, and in one place only, namely, in the Nanaimo district, were a few specimens found.

Among the insects which have demanded special attention during 1901 are the following :—

The San José Scale.—The fumigating stations at St. John, N.B., St. Johns, Que., Niagara Falls and Windsor, Ont., Winnipeg, Man., and Vancouver, B.C., have been maintained and have been so successful that no well-founded complaints either of living scales being found on the trees, or of injury to the latter, have been received, although this work has been closely scrutinized, particularly by those who did not appreciate the great danger of allowing the importation of this insect. Extensive and important experiments have been carried on by the provincial government of Ontario, and by the State Entomologist, of Ohio. The Dominion Entomologist has kept in close touch with the officials in charge of these experiments and has visited with them all parts of their work. On the whole, these experiments have been very satisfactory, and it may now be said that practical remedies have been discovered by which the scale can be controlled on infested trees, by persistent treatment, to such a measure as to allow of the production of a paying crop, and without injury to the trees. These remedies are Whale-oil Soap in the proportion of 2½ pounds to 1 imperial gallon of water, Crude Petroleum, 20 per cent of a mechanical mixture with water, but not more than one quart of oil to an average sized bearing peach tree, and Fumigation, for small trees with hydrocyanic acid gas.

The Hessian Fly.—Great injury was done by this insect to the fall wheat crop sown in 1900 and also to the spring wheat of 1901. From present indications the attack on fall wheat this autumn is considerably lighter. This is undoubtedly due to farmers having adopted the advice given by entomologists as to sowing later than is the usual custom.

The Grain Aphis.—Wheat in the North-west was in some places badly injured by this insect.

Cut-worms.—The oat crop in Manitoba was very seriously lessened by cut-worms (*Carneades ochrogaster*), hundreds of acres in some cases being cut down by them, so that the crop had to be resown. Useful advice was given by the division as to the time when it would be safe to resow, and as to remedies.

Canker-worms.—These destructive caterpillars did much harm to some orchards in western Ontario. Early and persistent spraying is the proper remedy, combined with the banding of the trees in autumn.

The Black Cherry Aphis has been abundant and troublesome in Ontario, Quebec and Nova Scotia.

The Birch Skeletonizer.—The caterpillars of a small moth (*Bucculatrix canadensisella*), which did much harm in 1892, appeared again this year, and in the month of August very seriously disfigured birch trees throughout the province of Ontario. By the 1st September the foliage of birches had been reduced to a lace-like skeleton, by myriads of the small caterpillars, or had already dropped from the trees.

The Buffalo Carpet Beetle.—This pernicious enemy of the housekeeper is spreading rapidly through Canada. It has been found destructive in houses in many parts of Ontario and has lately been received from the Eastern Townships of Quebec.

DIVISION OF CHEMISTRY.

An outline account of some of the more important investigations conducted during the past year by this division may be given as follows, the data in detail and conclusions therefrom appearing in the annual report of the Chemist for 1901.

Soils.—An important series of soils from the reclaimed marshes bordering on the Bay of Fundy has been submitted to careful and complete chemical analysis. Since the results show the character of these tide-deposited soils before and after cultivation and under varying conditions of drainage and tillage, the data obtained will prove of more than ordinary interest to farmers in the maritime provinces cultivating similar lands. Suggestions are made for the economic maintenance of the fertility of these soils, many of which have in the past been amongst the most productive of the Dominion.

Special examination has been made of a number of soils, both virgin and cultivated, from various parts of Canada to ascertain their adequacy or deficiency in lime. In many instances it has been found that soils otherwise rich in plant food are poor in available lime, and this is true not only of low-lying, sour and mucky soils, but frequently also of upland and apparently well aerated loams. The judicious use of lime (or compounds containing it, such as marl and wood ashes), especially in conjunction with organic manures, has been emphasized, both for sandy and heavy clay soils, in which it will not only act beneficially in furnishing plant food, but also in improving tilth.

The Relation of Cover Crops and Surface Tillage to the Moisture Content of Soils.—This experiment included the estimation of the moisture fortnightly throughout the summer and autumn in orchard soils, (*a*) under a cover crop of clover, and, (*b*) under cultivation. The data obtained are of particular interest to orchardists and fruit-growers, for they furnish evidence of an exceedingly marked character as to the principles and value of this new and, in many districts, most effective system for the maintenance of fertility and the conservation of moisture in orchard soils.

Naturally-occurring Fertilizers.—These include marls, swamp mucks and deposits of an alluvial character, both of fresh and salt water origin, sea-weed, eel grass, &c. Many of such materials have been shown to contain notable amounts of plant food and, with suitable treatment, to be of considerable value to farmers residing in the neighbourhood in which they occur.

Fodders and Feeding Stuffs.—Many milling and other by-products upon our markets, including the various meals from the manufacture of corn starch, as produced in Canada, have been analyzed and their relative feeding value determined. As there has been a considerable increase in the price of these concentrated feeds lately, it behooves the stock-raiser and dairyman to carefully look into the nature of such materials as he may find it necessary to purchase. Protein and fat are the two most important constituents, and it will be according to the percentages in which they exist that these feeds must be valued. These 'concentrates' differ widely in character, and it is only by consulting such data as are to be found in the Chemist's report on this subject, and using judgment, that economic feeding and milk production can be carried on.

The composition of the ordinary farm roots has again been a matter of research. The value of sugar beets as fodder as compared with mangels, carrots, turnips, &c., has been determined and much useful information generally regarding roots has been obtained. Thus it was found in the examination of mangels that the portion of the root growing above ground contained considerably less sugar than the portion beneath the soil, indicating the value of 'earthing up,' and also of the growth of such varieties as possessed a natural tendency to keep under ground—provided, of course, they gave a satisfactory yield.

In connection with this branch of the work, the following researches are now in progress and will be dealt with in the forthcoming report :—

1. *The composition of Indian corn and of clover before and after ensiling.*—This investigation will, we trust, throw some light upon the changes in composition undergone by these important fodder plants during ensiling, and the relative feeding value of the material as it goes into and comes out of the silo.

2. *Corn in hills and drills.*—The yield of real cattle food obtained per acre from Indian corn sown in hills, as compared with that sown in drills or rows, is being determined.

3. *Clover.*—To ascertain whether the plan of two or four cuttings of this plant during the season is the more economical, analyses have be made of the crops obtained under the different systems.

Chemistry of Insecticides.—Several investigations have been made in the laboratories in connection with the preparation of these compounds, and the character of certain newly introduced insecticides ascertained.

Soft Pork Investigation.—This work, begun some three years ago, has been brought to a successful conclusion during the past year, and the results and conclusions therefrom issued in a bulletin, No. 38, Farm Series. Among other deductions, it may be noted that the quality of the pork produced is controlled very largely by the character of the food used, and that while Indian corn and beans undoubtedly tend to the production of soft pork, this tendency can in a large measure be counteracted by the use of skim milk.

It was found that with all classes of rations skim milk invariably gave a firmer pork than the same ration without skim milk.

Well Waters.—Nearly one hundred samples of well waters from farm homesteads were forwarded for examination. Sixty-five of these were submitted to analysis and reported upon. Insufficient quantity and other causes prevented any useful examination of the remainder.

Samples Received.—During the past year 501 samples were received at the Farm laboratories for examination. These comprised soils, feeding stuffs, fertilizers, &c., &c., and came from all parts of the Dominion. As far as opportunity permitted, or the nature of the case demanded, these samples have been examined. In certain instances, matters of general importance to the farming community have in this way been brought before our notice, but, naturally, many of the samples have a personal interest to the sender only, and in such cases their analysis could not be undertaken.

Tuberculin.—During the twelve months ending October 31, 1901, 8,164 doses of tuberculin have been prepared and forwarded by this division to the Government Veterinary Inspectors.

Correspondence.—The letters received by this division for the same year ending October 31, 1901, numbered 1,213 ; those despatched for the same period, 1,127.

POULTRY DEPARTMENT.

In this division of the Farm work some new breeds of poultry have been introduced during the past year. Many experiments have been carried on in the breeding of different varieties, also in cross-breeding and in the artificial hatching and raising of chickens. Successful efforts have been made by special feeding to bring on early moulting so that the hens may be brought to lay earlier in the winter. Tests have also been made as to methods of feeding to bring about the largest production of eggs at the time when they command the highest prices. A comparison of the different breeds under trial as to their powers of annual egg production has also been made and the results recorded. Further experiments have been carried on to gain information as to the rapidity with which the different sorts may be fattened and their relative value for the table ascertained.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

At the Experimental Farm at Nappan, N.S., the experiments conducted have been planned with the object of making them specially useful to the farmers of the maritime provinces. These include trials of the most promising varieties of cereals, fodder corn, field roots and potatoes, to ascertain how far the sorts under test are adapted to the conditions which prevail in these provinces. Experiments have also been conducted with mixed grain crops, with sugar beets, with different varieties of buckwheat and many other agricultural products. Further trials have also been made with different fertilizers to gain information regarding their effect on the more important farm crops. Additional experience has also been had in reference to the question of the rotation of crops. Many samples of promising sorts of grain are distributed among farmers every year for test.

Some useful additions have been made to the dairy herd by the recent importation of valuable animals from Great Britain, notably Guernseys and Ayrshires. The flock of sheep has also been greatly improved by the addition of a number of pure-bred Shropshires and Leicesters. Further experiments have been conducted in the feeding of steers of different ages, also in the feeding of swine.

In the horticultural branch, additions have been made to the varieties of fruits under cultivation. Experiments have been instituted to demonstrate the value of spraying to subdue injurious insects and destructive fungi. Tests have also been made with remedies for scale insects on apple trees ; also on other insect pests. A large number of trials has been made with different sorts of tomatoes, cabbage, cauliflower, pease and beans to ascertain which are the earliest to mature, the best as to quality and the most productive in that climate.

Many additions have been made to the groups of herbaceous perennial plants, and to the ornamental trees and shrubs, concerning which there is an ever-increasing demand for information. A very fine display of bloom from annual flowers was made during the season and this was much admired by visitors.

EXPERIMENTAL FARM FOR MANITOBA.

The Experimental Farm at Brandon has many attractions for the farmers of Manitoba, and thousands of them visit it every year seeking information on many different subjects. On the farm they find many demonstrations along different lines of agricultural and horticultural work. Among the agricultural tests, there are experiments with all promising varieties of cereals, including the newest sorts obtainable, to test their relative merits as to earliness and productiveness—trials as to the best methods of preparing the soil for crop, the best time for sowing, the quantity of seed to be used per acre and the depth in the soil which it should be placed for the best results. Fodder crops, grasses, field roots and potatoes have also claimed much attention and the results of many useful experiments along these lines are given each year in the annual report of the Farm.

Many varieties of the Siberian Crab (*Pyrus baccata*) and the cross-bred sorts obtained therefrom, are under test. All the varieties so far tried have proved quite hardy. Several useful sorts have borne fruit and the outlook along this line is very hopeful. Many varieties of seedling plums also fruited during the past season, some of which are of good size and very fair quality. Additions have been made to the small fruits under test and some new sorts of forest and ornamental trees and shrubs have also been added to the list for trial as to hardiness and general usefulness. Ornamental plants have claimed further attention, especially hardy bulbous and herbaceous species of a perennial character. Information as to the results of these trials, widely spread, will enable settlers to make their homes more attractive and hence lead to greater contentment.

Many sorts of vegetables have been tried and lists published of those suitable for farmers in Manitoba. A large distribution has been made this year of hardy trees and shrubs and seeds of forest trees and samples of seed grain, and potatoes, also samples of the seeds of grasses. These annual distributions are much appreciated and have proved a great boon to the farmers of Manitoba. Fine displays of grain were sent also from this farm to the exhibitions in Glasgow and Buffalo.

At my request a large quantity of young forest trees have been grown from seed at Brandon for the use of the forestry branch of the Department of the Interior.

Experiments have again been conducted in the feeding of steers, swine and poultry, also with bees. Excellent collections of cereals and other agricultural crops were prepared at this farm for the Glasgow and Buffalo exhibitions.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

The good influence of the work of the Experimental Farm at Indian Head on the farmers in that part of the country has been manifest for some years past in the in-

creased crops produced in that district. The influence which a proper preparation of the soil in that climate has had on the volume of the grain crops, has been very marked, especially in regard to summer fallowing. The demonstrations which have been made on the Farm along that particular line of work have been so successful in bringing increased crops that farmers in that vicinity have followed the example given them with great profit. The agricultural experiments conducted during the past year have covered a wide field, including trials of all the more promising sorts of cereals, Indian corn, field roots and potatoes, and much valuable information has been gathered for the forthcoming report. With other fodder plants and grasses many useful tests have been made. The Awnless Brome grass has been a great success, large fields on the experimental farm having given during the past year an average of 3½ tons to the acre of cured hay. The variety known as western rye grass has also succeeded remarkably well.

Many experiments have been carried on with such garden crops as small fruits and vegetables, with much success and information of value to farmers has been gained in reference to the quality of the different sorts tested and their usefulness when grown in the north-west climate. Experiments have also been conducted in the rotation of crops.

The cattle composing the herd at this Farm consisting of Shorthorns, Ayrshires and grades are making satisfactory progress. Further feeding experiments have been conducted with steers and swine to gain information as to the cheapest methods of producing beef and pork.

The fruit crop during the past year has been very encouraging. One of the small orchards planted with varieties of the Siberian crab bore fruit abundantly, the trees being weighed down with their load. There was also a good crop of plums of different sorts, chiefly seedlings, many of them of fair quality. These crops awakened much interest among visiting farmers as these were the first crops of consequence ever produced of these fruits in the Territories. The crab apples were found to be excellent for jelly and the plums for preserving. The portion of this crop offered for sale brought good prices.

The experiments in the forestry branch have been enlarged and now all the roads on the Farm are planted with avenues or shelter belts of trees, and larger groups and clumps are scattered here and there over the Farm affording protection to buildings, garden and fruit crops, also for cattle, and to some extent for field crops. A large number of young trees have been grown here under my instruction to assist the forestry experiments undertaken by the Department of the Interior.

Many packages of young trees and shrubs, tree seeds, grass seeds and samples of seed grain and potatoes have been sent out for trial during the past year to farmers in all parts of the Territories.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

The trials made at this Farm during the past year with a large number of promising varieties of oats, wheat, barley, pease, Indian corn, field roots and potatoes, to

gain information as to those best suited to the climate of British Columbia, have been very successful, and the returns most encouraging. While the spring was cold and backward the rainfall was not too heavy for farm crops, and towards the end of June and through July and August the weather at the Experimental Farm was very favourable for the growing grain, fodder crops and roots, and in most instances excellent returns have been realized. The potatoes have given an extraordinary yield. Experiments have also been conducted with wheat, oats and barley, using different quantities of seed per acre so that information might be gained as to the quantity most likely to produce the best results. Also with seed gathered from selected heads of these cereals compared with well screened seed from ordinary field crops.

Tests have been made with artificial fertilizers on some of the more important field crops.

A shipment of pure bred Shorthorn cattle was made to this Farm during the past season, consisting of fourteen heifers and one bull. Six of these were sold at Victoria, at the sale of the British Columbia Dairymen's Association. The remainder have been reserved at the Farm for breeding purposes. The sheep, pigs and poultry are all reported on as doing well.

While most of the varieties of small fruits yielded well, the larger fruits gave in most cases poor crops. As the trees blossomed well, this partial failure was no doubt mainly due to the very wet weather which prevailed during the blossoming period which prevented much of the fruit from setting. There were, however, many trees bearing fruit and among them a considerable number of new sorts which had not fruited here before. Descriptions of the character and quality of these were taken by the Superintendent, and will be reported on.

The vegetable garden contained a fine assortment of all the leading vegetables. In the annual report much information will be found as to the earliness, productiveness and quality of the different sorts tested.

In the nut orchard the English, Japanese, heart-shaped and American walnuts all fruited, some of them for the first time. As these trees promise well in that climate, the nuts were saved and distributed for planting to farmers and others interested in nut growing in British Columbia.

The plantations of valuable timber trees also of ornamental trees and shrubs are making rapid growth.

ARCHIVES.

The work of this Branch goes on as usual, with the strictest regard to economy and efficiency. The state papers for Lower Canada published in this report, including the years 1836 and 1837, contain the correspondence of the Earl of Gosford, who was sent out as head of the Commission to Investigate Grievances. Those for Upper Canada contain the final correspondence of Sir John Colborne, afterwards Lord Seaton, and the appointment of Sir F. B. Head who succeeded him, with copies of dispatches addressed to him in 1835 and 1836.

III.—PATENTS OF INVENTION.

The following comparative tables show the transactions of the Patent Branch of the Department of Agriculture, from the calendar year 1891, to the year ending October 31, 1901 :—

Years.	Applications for Patents.	Patents and Certificates Granted.			Caveats.	Assignments of Patents.
		Patents	Certificates.	Total.		
1891	3,233	2,343	393	2,736	215	1,231
1892	3,176	3,417	415	3,832	242	1,500
*1893	2,614	3,153	292	3,445	229	1,345
1894	3,291	2,756	462	3,218	301	1,445
1895	3,387	3,074	422	3,496	343	1,550
1896	3,728	3,488	413	3,901	306	1,420
1897	4,300	4,013	284	4,297	377	1,551
1898	4,200	3,611	262	3,873	363	1,657
1899	4,305	3,151	412	3,563	311	1,467
1900	4,628	4,522	482	5,004	283	1,914
1901	4,817	4,766	551	5,317	302	2, 323

* For 10 months only.

Detailed Statement, Patent Office Fees.

Years.	Patents.	Assignments.	Caveats.	Copies.	Subscription to *Patent Record.*	Notices to Apply for Patent.	Sundries.	Total.
	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
1891	72,664 26	2,411 95	1,124 60	782 29	.....	.....	340 53	77,723 63
1892	71,840 84	2,794 66	1,270 13	793 32	236 52	89 96	195 33	77,216 76
*1893	58,441 81	2,633 71	1,244 70	796 15	285 18	337 81	110 73	63,850 19
1894	73,061 77	3,142 74	1,793 40	764 07	347 21	1,449 80	123 57	80,682 56
1895	78,223 52	3,194 00	1,854 35	761 54	245 98	1,951 30	129 79	86,358 48
1896	85,060 61	3,130 56	1,790 65	898 27	420 60	2,245 79	57 04	93,532 52
1897	93,298 16	3,250 23	2,108 57	969 33	252 53	2,110 89	128 21	102,117 92
1898	91,176 44	3,641 00	1,935 74	706 50	266 44	1,463 10	172 73	99,361 95
1899	98,669 92	3,781 71	1,533 25	1,028 80	198 05	1,912 00	137 83	107,261 56
1900	104,848 96	4,255 40	1,405 00	932 54	552 71	1,742 70	115 15	113,852 46
1901	109,985 59	4,506 07	1,479 25	882 87	592 47	2,484 90	133 22	120,064 37

* For 10 months only.

The Patent Office fees received during the year ended October 31, show a surplus of $69.211.38 over the working expenses of the office as per subjoined table.

Receipts.		Expenditure.	
	$ cts.		$ cts.
Cash received	120,064 37	Salaries	33,918 41
Cash refunded	2,039 70	*Patent Record*	14,894 88
			48,813 29
		Receipts over expenditure	69,211 38
Net cash	118,024 67		118,024 67

The following is a table of the countries of residence of the patentees for the years named :—

Countries.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Canada	606	671	685	661	707	740	756	710	601	707	744
England	122	298	206	177	179	215	266	261	205	254	256
United States	1,519	2,227	2,061	1,731	1,980	2,270	2,666	2,312	2,038	3,216	3,423
France	10	26	24	24	21	24	26	39	36	40	50
Germany	36	106	88	108	102	117	126	124	112	157	125
Other countries	50	89	89	55	85	122	173	165	159	148	168
Total	2,343	3,417	*3,153	2,756	3,074	3,488	4,013	3,611	3,151	4,522	4,766

* For 10 months only.

The Canadian patentees were distributed among the provinces of the Dominion as follows :—

Provinces.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Ontario	394	464	437	404	451	430	464	383	310	396	407
Quebec	140	131	151	162	177	201	178	171	140	164	185
New Brunswick	16	19	23	13	13	12	20	26	7	14	26
Nova Scotia	22	16	29	15	19	32	22	27	18	21	17
Prince Edward Island	1	1	3	2	6	2	2	4	8	1	0
Manitoba and the North-west Territories	28	22	26	38	18	28	36	45	50	42	52
British Columbia	5	18	16	27	23	35	34	54	48	69	57
Total	606	671	*685	661	707	740	756	710	601	707	744

* For 10 months only.

Statement of the number of Patents issued under the Act of the session of 1892, 55-56 Vic., chap. 24, on which the fees are paid for periods of six, twelve or eighteen years, at the option of the patentee ; and of Patents on which certificates of payments of fees were attached after the issue of Patents originally granted for periods of five and ten years.

Years.	Periods for which the Fees were paid on first issue.			Patents on which Certificates were attached after issue.			
	6 yrs.	12 yrs.	18 yrs.	6 yrs.	12 yrs.	5 yrs.	10 yrs.
1892 (Six months ended December 31)	2,141	3	35		3	387	25
1893 (Ten months ended October 31)	3,098	9	46		3	279	10
1894 (Twelve months ended October 31)	2,701	9	46		4	433	25
1895 " "	3,049	5	20			416	6
1896 " "	3,443	11	34	2		401	10
1897 " "	3,981	8	24	15	3	262	4
1898 " "	3,586	3	22	176	9	77	0
1899 " "	3,125	3	23	291	13	108	0
1900 " "	4,489	4	29	366	21	101	0
1901 " "	4,719	8	39	408	31	112	0

It will be found in the preceding tables that the total revenue for the year was $120,064.37, being the largest in the history of this branch of the Department, resulting in an increase of $6,211.91 over the preceding year and a surplus of $69,211.38 over the expenditure.

As in previous years, the larger proportion of applications for patents came from inventors resident in the United States, to whom were granted 3,423, over 71 per-centum of the whole issue.

The number of petitions under section 37 of The Patent Act, in which satisfactory reasons were shown to justify the granting of the importing privilege, was 1,604, and of the manufacturing privilege, 2,340.

The total number of reports issued by the examiners during the year was 6,395.

The Office has again to remind applicants that great care should be taken in the preparation of the papers which are required by the rules and forms, and unless competent to prepare them, they should employ a skilled attorney, as the value of patents is largely based upon the ability with which the specification and claims have been prepared.

There has been a slight increase in the number of foreign patentees, who, under section 8 of the Patent Act, gave the Commissioner notice of their intention to apply for patents in Canada, 1,119 of these notices having been registered during the year, yielding a revenue of $2,484.90.

The Canadian Patent Office Record, published in monthly numbers, is found to be of great and increasing value to all who are interested in patents. It affords convenient and easy reference to the claims and diagrams of all patents granted in Canada, as well as containing a list of registered copyrights, trade marks and designs. The Office gratuitously furnishes copies of this publication to a large number of free libraries in Canada and in foreign countries, with the object of diffusing in the public interest the information therein contained. The revenue derived from private subscription during the past year amounted to $592.47.

The work of the much needed classification of Canadian patents is progressing favourably, and as an outcome of this compilation, the Office will be able at an early date to publish a complete and general index of inventions of all patents granted to the present year. This will prove a valuable index to solicitors of patents, manufacturers and those interested in patents, for the reason that there will be a complete uniformity throughout, which is almost impossible to expect in indexes compiled year by year, and by different persons.

A further addition has been made to the Patent Office Library, by the purchase of 400 volumes of scientific works, intended mainly for the use of the examiners in the discharge of their duities.

The attention of patentees and their solicitors is again called to the necessity of remitting partial fees before the expiry of the six and twelve years' terms, otherwise the patents will cease and determine, the Commissioner not being vested with the discretionary power, under any circumstances, to revive them. A revival can only be

secured by a private Act of Parliament, the obtaining of which entails considerable expense to the patentee. It may further be added that the committee on private Bills usually discourages applications of this kind on the ground that no one should be denied the right of using or vending an invention which has fallen into the public domain ; exceptional cases may arise, however, in which the patentee or the holder of the patent may be justly entitled to relief from parliament.

IV.—COPYRIGHTS, TRADE MARKS, INDUSTRIAL DESIGNS AND TIMBER MARKS.

STATEMENT of fees received by the Copyright and Trade Mark Branch, from November 1, 1900, to October 31, 1901.

Months.	Trade Marks.	Copy-rights.	Designs.	Timber Marks.	Assign-ments.	Copies.	Total.
1900.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
November	861 75	88 50	25 00	14 00	35 00	4 00	1,028 25
December	1,159 25	112 50	55 00	2 00	47 00	9 50	1,385 25
1901.							
January	850 25	76 50	35 00	2 00	16 25	10 50	990 50
February	1,091 00	74 00	50 00	8 00	21 00	17 50	1,261 50
March	2,161 25	87 50	93 00	.....	24 00	8 50	2,374 25
April	1,355 25	112 50	74 00	2 00	35 10	7 00	1,585 85
May	1,516 10	85 00	173 00	.....	26 00	10 00	1,810 10
June	949 73	115 50	62 60	2 00	16 00	15 00	1,160 23
July	1,364 92	73 50	64 00	.....	42 76	19 50	1,564 68
August	1,050 25	88 00	45 00	8 00	21 25	.....	1,212 50
September	791 00	99 00	25 00	4 00	21 00	6 00	946 00
October	1,289 00	101 00	30 00	6 00	48 00	30 15	1,504 15
	14,439 75	1,113 50	731 09	48 00	353 36	137 65	16,823 26

The following table shows a comparative statement of the business of this Branch from 1891 to October 31, 1901, inclusive :—

Year.	Letters Received.	Letters Sent.	Copyrights Registered.	Certificates of Copyrights.	Trade Marks Registered.	Certificates of Trade Marks.	Industrial Designs Registered.	Certificates of Industrial Designs.	Timber Marks Registered.	Certificates of Timber Marks.	Assignments Registered.	Fees Received.
												$ cts.
1891.....	1,651	2,385	541	174	307	307	129	129	11	11	51	9,236 96
1892	1,773	2,300	536	159	294	294	30	30	27	27	66	9,496 29
1893.	1,432	2,070	475	126	257	257	41	41	19	19	55	8,013 33
1894...	1,882	2,720	546	216	311	311	39	39	20	20	77	9,463 63
1895	2,184	3,279	601	163	374	374	52	52	20	20	70	11,673 26
1896.....	2,185	3,437	653	212	331	331	68	68	14	14	161	10,579 54
1897.....	2,606	3,548	756	273	446	446	75	75	13	13	94	14,101 93
1898..	2,576	3,453	734	275	423	423	136	136	15	15	114	13,535 17
1899..	2,487	2,910	702	237	430	430	112	112	5	5	117	14,161 28
1900	2,679	3,213	893	247	447	447	126	126	22	22	136	14,782 53
1901.....	2,605	3,211	888	249	521	521	146	146	24	24	183	16,823 26

The total number of registrations of copyrights, trade marks, industrial designs and timber marks, including registrations of assignments, was 1,762 during the year ended October 31, 1901. This consisted of 830 registrations of copyrights, 521 registrations of trade marks, 146 of industrial designs and 24 of timber marks. There were also issued 226 certificates of copyrights, 58 registrations of interim copyrights, and 23 certificates, 18 registrations of temporary copyrights, and 2 certificates. The total number of assignments of these different rights recorded was 183.

The correspondence of this branch of the department amounted to 2,605 letters received ; 3,211 letters sent.

The amount of fees received during the year, as certified by the accountant, amounted to $16,823.26.

V.—PUBLIC HEALTH AND QUARANTINE.

The year has been especially marked by the continued threatening of the bubonic plague and small-pox on both our coasts and along our frontier.

The Bubonic Plague.—The places of the occurrence of this disease have been numerous and widespread. It has raged in China and in India. It has prevailed in Russia in the districts of Astrakhan and Uralsk, and in Vladivostok; in Constantinople, Smyrna, Singapore, Manilla, Hong Kong, Formosa, Japan, Honolulu, Austra-

lia, New Zealand, Brazil, Egypt, Cape Colony, Naples, Reunion and Mauritius. It has been brought to the ports of Southampton, Cardiff, Hull and Shields, to Durban in South Africa, and to San Diego in California. Within the last day or two three cases in Liverpool and four in Glasgow are reported to have occurred. In San Francisco it has been present throughout the year in the Chinatown of that city; fatal cases having been reported in almost each month, and making a total since its first appearance in March of last year of 45 cases and 41 deaths.

Small-pox.—Small-pox has come to my Quarantine Stations on both the Atlantic and Pacific coasts, but in each such instance the outbreak has been limited to and stamped out at the Quarantine Station. It has also prevailed extensively in the United States throughout the year. The public health reports published officially at Washington give the total of cases actually reported in the six months from January 1 to June 30, this year, as 30,710.

In the fourteen states bordering on Canada, from Alaska to Maine, inclusive, there are at present 8,728 reported cases.

Additional Precautionary Measures.—This threatening, both of the bubonic plague and small-pox, has necessitated the maintenance of frontier medical inspectors and guards at those of my unorganized Quarantine Stations where it has seemed the most serious from time to time. Especially has this been necessary on the railway crossings and trails where the public health organizations of the states bordering on any portion of our southern frontier have proved inadequate to successfully control the outbreaks of the disease.

For similar reasons my orders under section 9 of the Quarantine Regulations—excepting from those regulations vessels from San Francisco and ports north of it on the one ocean, and from New Yark and ports north of it on the other,—have been withdrawn.

Increased Public Health Staff.—These necessary measures have increased the staff of my public health service to close on forty medical officers, under my Director-General of Public Health.

Public Health Administration of the Territories.—In April last the public health administration of the North-west Territories and of the Yukon Territory was transferred to me by the Minister of the Interior. I thereupon sent Dr. James Patterson from Winnipeg to the Edmonton district to report upon and deal with the small-pox there. Subsequently I sent him to Regina to look after, from there as a centre, the various outbreaks of this disease in the Territories, and to work in harmony with the North-west government and in accordance with the provisions of the Territorial Health Ordinance. Dr. Patterson performed his onerous duties to my entire satisfaction.

National Bacteriological Laboratory.—Canada should be equipped with a national bacteriological laboratory as is the case in other countries. Such a laboratory could report promptly on suspected specimens of micro-organisms from vessels, trains, &c., held under quarantine of observation. The quality and purity of the various protective and curative agents, such as vaccine, tuberculin, Haffkine's prophylactic plague fluid, and the anti-toxins and serums of diphtheria, cholera, plague, typhoid, anthrax,

&c., are of the utmost importance to the public health and to the well-being of the country. Their manufacture might, therefore, be controlled by the government and not left in the hands of private interests as a commercial enterprise. They might be prepared by salaried officials in a national laboratory, and issued under the supervision and control of the government.

In this way the maximum protection of the people of Canada in this matter can alone be obtained, and that confidence secured which will induce the people to properly avail themselves of these all-important means of protection from epidemic disease.

Original Scientific Research.—With such a national laboratory Canada could then take a place, worthy of her great position and destinies, in original research, under governmental control, towards the advancement of science, and the consequent benefit of all mankind.

The Permanent Staff.—Dr. W. H. K. Anderson has been appointed medical assistant at the William Head Quarantine Station, B.C., replacing the officer whom I had temporarily transferred there from his work elsewhere. Dr. W. W. Aylen has been appointed medical assistant at Grosse Isle, Que., vice Dr. F. W. Church who has left the service. These are the only changes in the permanent medical staff during the year.

Details of the Year's Work.—Full details concerning the year's work at my different stations will be found in the reports of my officers annexed as appendices.

TRACADIE LAZARETTO.

Four of the leper inmates of this establishment died during the year. Two new cases were admitted, both from the district of Shippegan. The present number of patients is 18, 11 male and 7 female.

PUBLIC WORKS HEALTH ACT.

I caused to be issued on May 25 of this year a series of regulations by Order in Council, in virtue of the provisions of the Act 62-63 Victoria, chap. 30, intituled 'An Act for the preservation of health on Public Works.' These regulations were established in lieu of those under the previous Order in Council of January 31, 1900. These regulations provide :—

(*a*) As to the extent and character of the accommodation to be afforded by the houses, tents, or other quarters occupied by the employees on the works ;

(*b*) for the inspection of such houses, tents or other quarters, and the cleansing, purifying and disinfecting thereof where necessary ;

(*c*) as to the number of qualified medical men to be employed on the works ;

(*d*) for the provision of hospitals on the works and as to the number, location and character of such hospitals ;

(*e*) for the isolation and care of persons suffering from contagious or infectious diseases.

Mr. Fisher, my inspector under this Act, has made official visits to the various public works covered by section 1 of the Act and coming within the legislative authority of the Parliament of Canada.

He reports to me a general satisfaction with the Act and the enforcement of the public health regulations under it.

VI.—STATISTICS.

The Statistical Division of the Department of Agriculture is based upon the Union Act, which specifically assigns census and statistics to the exclusive authority of the Parliament of Canada.

In accordance with this assignment of duties, the Parliament of Canada passed chap. 21, Acts of 42 Victoria.

In the Revised Statutes of Canada, 1886, this Act forms chapters 58 and 59. Chap. 60 is the authority for the collection of criminal statistics.

As misapprehension seems to exist leading to indiscriminate and unofficial publication of statistics, sections of the Act, chap. 59, R.S.C., are here given :—

The first section provides for the collecting, abstracting, tabulating and publishing of vital, agricultural, commercial, criminal and other statistics by the Department of Agriculture.

The fourth section gives the Minister of Agriculture power to arrange with any Lieutenant-Governor in Council, or with any provincial organization, for the collection and transmission of information collected under provincial systems.

The fifth section says :—

'The Minister of Agriculture may, in collecting statistics in the manner provided by this Act, call upon any and all public officers to furnish copies of papers and documents and such information as lie respectively in the power of such officers to furnish, with or without compensation for so doing, as is regulated, from time to time, by the Governor in Council.'

The sixth section provides for the publication of an abstract and record of the various departmental or other public reports and documents.

The seventh section gives power to the Governor in Council to authorize the Minister of Agriculture to cause special statistical investigations as regards subjects, localities or otherwise to be made.

The eighth section empowers the Minister of Agriculture to cause all statistical information obtained to be examined, and any omissions, defects or inaccuracies discernible therein to be supplemented and corrected as far as possible.

The ninth section is as follows :—

'Every one who wilfully gives false information or practises any deception in furnishing information provided for by this Act shall on summary conviction before two justices of the peace, be liable to a penalty not exceeding one hundred dollars.'

By another section in the Act, the Governor in Council is empowered to appoint temporary clerks or employees for an indefinite period.

The evident aim and intention of these several Acts is the establishment of a Bureau of Statistics which shall form part of the Department of Agriculture, and in which shall be consolidated the general statistics of the country, the officers in charge of which shall have every facility necessary to enable them to obtain the needed statistics from the several departments of the federal government, of the provincial governments, or by special statistical investigations.

A general collection and issue of Dominion government statistics by the Statistical Division, as directed by the statute, would establish uniformity, coupled with increased accuracy and large economy in compilation.

The public appear to appreciate the efforts of this division of the Department of Agriculture, the preparation of general statistics in answer to inquiries being each year greatly in excess of the previous year ; the aim is to give all inquirers the best information obtainable. The Statistician's office has become a generaly inquiry office for all parts of the world.

In the course of these inquiries the Statistician has been forced to confess the fact that Canada lags behind other countries in many branches of statistics.

In no branch have there been so many inquiries as to that relating to agricultural statistics. These inquiries have necessarily been answered in a most unsatisfactory way, owing to the absence of any system of collecting agricultural statistics co-extensive with the Dominion. If a good plan, ensuring accuracy and early publication, could be adopted in Canada, the value to farmers and business men of this information can hardly be over-estimated.

HEALTH STATISTICS.

No steps have been taken as yet to provide a better system of collecting vital statistics than that which was abolished in 1891.

In the provinces of Ontario, Quebec, New Brunswick, British Columbia, Manitoba and the North-west Territories, the provincial and territorial authorities have placed on the statute-books Acts dealing with the collection of vital statistics. Section 4 of chap. 59, Revised Statutes, already quoted, gives the necessary legislative authority to enable my department to join the provincial authorities in making arrangements for the better collection of different kinds of statistics, without limiting the power of my Department to enter upon provincial fields not worked by provincial organizations. By a combination of forces the result would be more satisfactory than by any other system that could be originated by the federal authorities. Instead of clashing statistics there would be statistics having a joint approval.

This plan could be carried out in respect to agricultural statistics ; so that while each province could have its own statistics for publication, the world at large would have those of the Dominion. The very great attention given to crop statistics in the

United Kingdom, United States, France, Germany and Australia, and the large monetary operations based upon them, make it almost imperative upon Canada to provide her farmers and business men with these aids to successful efforts.

CRIMINAL STATISTICS.

The special analysis of these statistics which has usually accompanied the general report of the Department has been transferred this year to the preliminary pages of the blue-book giving the compilation of the criminal records.

1. It is only necessary, therefore, to mention a few of the salient points.

The number of convictions in 1900 was 10·72 per 10,000 inhabitants—which is practically the same as in 1899. British Columbia is above the average, having 26·40 convictions in every 10,000 of its people. The Territories come next with 18·49 convictions in every 10,000 of the people living there. Ontario is third with 12·01 convictions ; Manitoba fourth with 11·37 ; Quebec fifth with 9·18 ; Nova Scotia sixth with 7·07, and New Brunswick and Prince Edward Island seventh and eighth with 4·26 and 2·48, respectively.

2. The proportion of females among the criminal class has constantly decreased. During 1884-91 it was 8·6 per cent. During 1892-1899 it was 6·7 per cent and in 1900, it was 5·8 per cent.

3. The records show a tendency towards a habitually criminal class. The individuals are fewer ; each has more crimes to his record.

4. Taking numbers the serious crime of the country is located in the class 'Offences Against Property Without Violence,' in which class 63 per cent of the indictable offences fall.

5. Juvenile delinquency showed a tendency to diminish during 1900. During previous years the number of youthful criminals showed a steady increase.

THE STATISTICAL YEAR-BOOK.

The work is published by my Department under authority of chap. 59, sec. 6, Revised Statutes of Canada.

The demands for the work increase every year. Requests for the 1900 edition from the governments, public libraries and chambers of commerce of France, Germany, the United States, Italy, Japan and other foreign countries have been received, while the number required for the United Kingdom and other portions of the British Empire has been larger than ever.

An increasing number of lengthy notices, abstracts and resumes of the Year-book is noticeable in the newspapers of Great Britain, the United States, France, Germany, Japan and other countries.

The demand within Canada continues to increase every year.

There is a great demand for back numbers to make up full sets. As a result, the editions of 1893, 1894, 1895, 1896 and 1898 in English are completely exhausted.

The Year-book in French has been increasingly in demand. Of the earlier years there is a good number in stock. Of later years, 1891-98, there remain very few copies, and of 1891, 1893, 1894 and 1895 none at all.

The demand of late years for the French version is the most satisfactory fact in the history of the Year-Book.

There has been a very considerable demand for other publications of the Statistical Division. The Glasgow and Pan-American Exhibitions were supplied with a Handbook on Canada and a pamphlet on Pulpwood and Wood Pulp, which were in great demand.

During the year the letters, circulars and statements sent out from the office numbered 7,861, and those received 8,553.

The whole respectfully submitted,

SYDNEY A. FISHER,
Minister of Agriculture.

APPENDICES

QUARANTINE AND PUBLIC HEALTH

No. 1.

REPORT OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH.

(F. Montizambert, M.D. Edin., F.R.S.C., D.C.L.)

October 31, 1901.

Sir,—I have the honour to submit this my annual report as Director-General of Public Health, to October 31, 1901.

Amongst the graver epidemic diseases which have threatened Canada this year, on both coasts and along our inland frontiers, the bubonic plague and small-pox have continued to hold their evil pre-eminence.

Bubonic Plague.—In San Francisco, at the date of my last report a year ago, there had been nineteen cases of plague reported, with seventeen deaths. At that date, October 31 and November 1, three more deaths were reported. One of them was a white woman, a professional nurse, who had been attending a case reported as 'nasal diphtheria.' From that date there were not any cases publicly reported until January when two fatal cases occurred, and they have been followed by six in February, one in March, two in April, four in July, one in August, all fatal. Last month six cases were reported, four of which were fatal. One fatal case was reported on the 10th of this month. So that in Chinatown, San Francisco, there have been reported so far this year twenty-three cases and twenty-one deaths. And since the first reported case in March of last year, forty-five cases and forty-one deaths. All these cases seem to have been of the bubonic type ; none of them of the pneumonic.

In January last, a special commission was appointed by the government of the United States for the purpose of ascertaining the existence or non-existence of bubonic plague in San Francisco. *Public Health*, a journal of sanitation, published in Philadelphia, reports as follows on the work of this commission :—

The Commissioners, Drs. L. F. Baker, University of Chicago ; E. C. Novy, University of Michigan, and Simon Flexner, University of Pennsylvania, met in San Francisco, January 27, and proceeded at once to acquaint themselves with the local sanitary situation.

This involved a thorough study of Chinatown, which comprises fourteen blocks in the heart of the city, contiguous to the business portion and the newer residence portion. Trolley cars pass constantly, and a lively pedestrian traffic continues all day and late at night. There is a mingling of the races to a greater extent than usual in cities. The dwellings of the poorer classes of Chinese are shockingly unsanitary, small rooms, much over-crowding, ventilation poor, insufficiently lighted, and generally filthy. Often these conditions prevail to a very great extent even in the more pretentious business buildings. The Chinese in this city are well fed, wages are high, food abundant and cheap. They wear shoes, stockings and trousers, a fact to remember, as it is believed by many that the bare legs and feet had much to do with the infection of the plague here.

Much difficulty was experienced in obtaining information owing to the secretive habits of these people. Again, they will not consent, if they can avoid it, to touch a body, nor to secrete one in their homes. They have a 'hall of tranquillity' to which the sick are transferred by their friends, where they are often left to die. Thirteen dead Chinese were inspected, six were proven to have died of plague. This was shown by post-mortem and bacteriological study. This work was done in the most careful and scientific manner. Each case was studied completely. The bacillus was identified in each instance. This bacillus is characteristic and not liable to confusion with other germs. The effects of animal inoculation are unmistakable.

A number of the cases met with were obviously instances of advanced tuberculosis; others were affected with various chronic diseases, such cases being of no interest for the investigation were visited only once. When patients were found who presented symptoms which were suggestive of plague, a careful examination was made ; in doubtful cases, the first visit was followed by others and the progress of the illness carefully watched. These regular visits of daily inspection were maintained until February 16, 1901, during which period a sufficient number of instances had been observed to permit the commissioners to conclude beyond possible doubt that cases of bubonic plague were occurring among the Chinese.

Referring to this *The Journal of the American Medical Association* asks:

How are we to explain the fact that the disease has not spread more rapidly ? There has certainly been no great outbreak and the disease itself has not occurred in violent enough form to excite any great alarm in the district in which it is occurring. The explanation is not easy, but several significant facts may be mentioned. The climate is not favourable to the spread of plague ; there is but little poverty in San Francisco ; even among the Chinese there is an absence of the marked destitution to be met with in native cities in China ; in California the Chinese are clothed, while in China and in India it is said that the people among whom the disease spreads go bare-footed and usually bare-legged, some of them wearing nothing but a breech-clout. It is possible too that owing to factors with which we are as yet unacquainted, the rats in San Francisco have not become infected ; our correspondents state that there has been no evidence as yet of an epidemic among the rats in the city, and, as is well known, practically every great epidemic among human beings has been preceded by an epidemic among rats of the place. We might think of the possibility of a low-grade of virulence among the bacilli which are at work in San Francisco, an excusable hypothesis in view of the fact that fulminating cases do not seem to have occurred and that in many of the fatal ones the illness lasted for two or three weeks. The experience is not peculiar to San Francisco, however ; precisely the same kind of sneaking epidemic occurred in Calcutta for two years or more before the big outbreak and a similar history attaches to various other places.

At Ann Arbor, Michigan, U.S., a student contracted the bubonic plague, it is reported by enfection from its bacillus with which he was working in the laboratory. He was kept isolated, and no further cases occurred there.

Plague has prevailed throughout the year in China and in India. It has occurred in Russia, in the districts of Astrakhan and Uralsk and in Vladivostock. In Constantinople, Smyrna, Singapore, Manilla, Hong Kong, Formosa, Japan, Honolulu, Australia, New Zealand, Brazil, Egypt, Cape Town, Reunion, Mauritius, Naples and Rio Janiero. It has been brought to the British ports of Southampton, Cardiff, Hull and Shields, to Durban, in South Africa, and to San Diego, in Southern California. Within the last day or two three cases in Liverpool and four in Glasgow are reported to have occurred. It is again present at Rio ; it is also reported at Batoum, and a fresh case in Australia, October 10, the first for two months.

The report on the epidemic of bubonic plague in Hong Kong during last year has been submitted to the British government by Dr. F. W. Clark, M.O.H. The *British Medical Journal* thus reviews this report :

The earlier part of the report shows in the following table a comparison of epidemics in 1894-96-98-99 and 1900 :—

	1894.	1896.	1898.	1899.	1900.
Cases..	2,679	1,204	1,320	1,486	1,082
Deaths....	2,485	1,078	1,175	1,428	1,034
Percentage mortality....	92·7	89·5	90·0	96·1	95·5

Of the 1,082 cases in 1900, 28 were non-Chinese, and of 1,034 deaths, 15 were non-Chinese. The Chinese case-mortality was very high (96 per cent), while the non-Chinese mortality was only 53·6 per cent. Among the non-Chinese fatal cases there was only one Epourean.

A 'Britisher employed at the naval yard who had only arrived in the colony from England six weeks previously. It has been observed before in this colony that new arrivals from temperate climates are far more liable to contract the disease and to succumb than are residents of some standing.'

Taking the Chinese cases, 720 were males and 334 females, that is, 31·7 per cent were females as compared with 1898, when the percentage was 35·8. The proportion of females in the Chinese population is 29·9 per cent. Chinese children appear to be even more susceptible to bubonic plague than adults, the mortality among them being 96·7 per cent. The greatest number of cases occurred during the second quarter of the year (April-June), there being 746 cases and 683 deaths.

'No fewer than 412 of the cases have been dead bodies found in the streets or floating in the harbour. These bodies are thrown out at night by the other occupants of the infected houses with a view to avoiding the disinfection of the premises, and it would appear to be impossible to put a stop to the practice without an enormous increase in the European police force in the colony. If this practice cannot be successfully dealt with, Dr. Clarke sees no other remedy than for the sanitary board to decide to cremate all dead bodies found in the streets, the harbour, &c.'

The returns show that in the city the average rat mortality above ground is from 400 to 500 a week, but that during an epidemic of bubonic plague as many as 2,000 are to be discovered ; the removal of these from the city is undoubtedly beneficial as removing one important source of infection both to human beings and to healthy rats. Though 400 Chinese coolies have been employed regularly in the scavenging and cleansing of the city, only 3 cases of bubonic plague occurred among them during the year.

An interesting case of infection by the bite of a sick rat occurred during the year.

'A man employed as a turncock, and living in No. 2 Health district, was bitten on the left thumb, and two or three days later the arm became swollen and painful. The case was not reported, and the man died in his home some nine or ten days after he had been bitten. On post-mortem examination two small wounds were found on the ball of the left thumb ; the left hand and forearm were much swollen, and in the left axilla there was a brawny œdematous swelling in the midst of which was a large hæmorrhagic gland ; a smear preparation from this gland showed numerous plague bacilli.'

A clear case of infection by inoculation was the following :—

'I was asked to see by an army medical officer an Indian lad, aged three and a half years. I found an abrasion of the left knee, which had been caused by a fall in the street while at play some two days previously ; the abrasion was covered by a dry scab and surrounded by an inflammatory areola ; the femoral glands in the left groin were enlarged and painful, and there were the other characteristic symptoms of the disease.'

The chart of bubonic fever and atmospheric temperature shows that, as in former years, the epidemic abates in this colony as soon as the mean atmospheric temperature rises above 80 degrees F. Early in the year the government procured a considerable quantity of Haffkine's prophylactic fluid, but unfortunately it has not been found possible to persuade many of the Chinese to accept protection in this form.

The total cases and deaths reported from Hong Kong up to September 16 for this year, are 1,740 and 639 respectively.

In India during the week ending October 5, the total number of deaths reported from plague was 7,043, and during the previous week 7,279. Most of these deaths were in the Bombay Presidency.

According to a telegram, dated Cairo, October 21, the total number of cases in all Egypt on that date was 5. Of this number, 2 (Europeans) were reported from Alexandria, and 3 (1 European and 2 natives) at Mit Ghamr. Since the outbreak of April 7 of this year, 182 cases of plague have been reported in Egypt, of which 88 terminated fatally, 89 have been cured, and 5 remain under treatment.

In the colony of Cape Town, Cape of Good Hope, the total cases to August 26 were 801, with 386 deaths. Of these 203 cases 68 deaths are reported to have been Europeans. Commenting on the sanitary state of Cape Town the *British Medical Journal* observes :

It is difficult for one dwelling in the British Isles to grasp fully what the sanitary, or rather the insanitary, environment of a 'native' city means. Moreover, many Europeans, living for years in a city surrounded by native dwellings, are often, in fact usually, totally ignorant of the over-crowded, poverty-stricken, and filthy dens in which the lower classes of natives, it may be only a short distance off, live ; and it is only when the remorseless teaching of an epidemic causes inquiry to be made that the true state of affairs is disclosed. This condition of affairs now prevails at Cape Town, and the reports we have read of the astonishment of the Governor during his visit to the slums are readily understood. In the older parts of Cape Town the streets are wide, and the houses built by old Dutch settlers are substantial, but alongside of these come the more recently-erected hovels of the native, frequently ranged in alleys and closes, actually reeking with filth and foul odours. Ill-paved, ill-drained, narrow, and sunless, these uninviting streets and overcrowded houses give shelter to natives hovering on the verge of starvation. If plague searched for a home, not even in Bombay or Canton could it find a more congenial environment than in Cape Town. In this cosmopolitan city, people of many races congregate. Indians, Malays and Chinese represent the chief coloured foreigners at work in the city, and Zulus, Fingoes and Kaffirs constitute the aborigines of the place. By every other coloured race, and by low-class Europeans, such as Polacks and other Russian immigrants, the aborigines are oppressed and robbed. The Kaffir, Zulu, or Fingo comes to Cape Town to labour at the docks or on the railway or other public works ; he leaves his wife and family behind him in his native kraal up-country, and whilst in Cape Town cares but little how he lives, provided he can save money to take home. It is this class of man that falls into the hands of the Polacks and Russian Jew, and it is from the native Kaffir that these land-sharks squeeze out their livelihood. For a piece of sacking to lie on, and 5 or 6 feet of floor space, the Kaffir has to pay 4d. to 8d. a night, whilst in the little three-roomed houses some thirty or forty men sleep. There is no European quarter distinct from the native dwelling. The hovels of the poor surround not infrequently the better-class houses of the Europeans ; and just as the two races dwell in affinity, so there is a considerable consanguinity, causing occasionally inextricably close relationship of the European and native elements. Half-caste women are chosen as wives by European men, as they find they are content to live in more humble dwellings and in a cheaper way than European women. British domestic servants are a rarity, but, as they prove expensive to keep compared with half-caste women, they are married by the better-off residents only. But the half-caste woman, even with a European husband, affects native friends and ways rather than the more civilized, and there is thereby kept afoot a con-

stant intimacy between the classes and races which involves an entanglement in social relations and in proximity of dwelling. It is no doubt this jumble of races and places that accounts for so many Europeans being attacked by plague, and it renders clearance of an 'area' well nigh an impossibility, so adjacent are the dwellings of the white and coloured races.

In British South Africa the total cases up to October 13 were 1,664, with 794 deaths. These were divided as follows : In the Cape Colony, 832 cases, with 397 deaths ; rate of mortality per cent 47·7 ; these included 209 cases amongst Europeans with 70 deaths, or 33·5 per cent. In the Cape Peninsula there were 742 and 360 deaths, or 48·5 per cent, including 189 Europeans, with 65 deaths, or 36·6 per cent. In Port Elizabeth 80 cases and 35 deaths, or 43·8 per cent, and in other places 10 cases, with 2 deaths, or 20 per cent, including Europeans, 5, with 1 death, or 20 per cent.

The report of the Department of Public Health of New South Wales on the 'Outbreak of Plague at Sydney, 1900,' is a very interesting document. The fulness of detail, the excellent illustrations, the condign discussion, and the prompt publication speak well for the state of organization of the department and for the energy and ability of the chief medical officer, Dr. J. Ashburton Thompson. The epidemic consisted in the attack with plague of 303 persons between January 19 and August 9, of whom 103 died. Of the multifarious branches of work entailed by the epidemic and adequately set forth in the present report, particular attention may be directed to the efforts to trace the manner of infection and the mode of spread of the disease. It seems to be quite conclusively shown that an epizootic disease among rats preceded the first case which occurred in man, and bacteriologic examination showed that the epizootic disease among the rats was bubonic plague. Further, that the area over which the epizootic extended was practically co-extensive with that over which the plague was observed in man. This epizootic died out at the same time as the epidemic ceased. The general conclusion based upon the evidence thus outlined is that 'The epidemic was caused by communication of the infection from rats to man.' As to the manner of transmission from rats to man, but little is said, as the opportunities for careful investigation of this point were not favourable. In seven of the cases distinct marks of fleabites were noted, and in two cases smears from the little vesiculo-papular lesion showed bacilli morphologically resembling the *B. pestis*. Fleas from infected rats were also examined, and in one the presence of plague bacilli was demonstrated definitely by means of inoculation into a guinea-pig. Should it eventually be established to general satisfaction that plague is communicated to man by means of fleas then it would seem from analogy that there is nothing inherently unreasonable in the theory of a bacterial origin of yellow fever although the disease is transmitted by mosquitoes as shown by the brilliant researches of Reed and his associates. From careful consideration of the facts of the Sydney epidemic, it also seems clear that the disease was not 'catching' in the ordinary sense of the word, and further that it was not communicated in any important degree by fomites. Rat-killing was instituted on a large scale ; a special rat-catching staff ultimately reported that it had destroyed 38,600, and the grand total killed by authority is 108,308. Of course, private persons killed a great number also. It is urged strongly that removal of all conditions favouring harbourage and breeding of rats in and near occupied premises be recognized and instituted as an important practical means of protection against epidemic plague. This means steady and faithful carrying out of certain well-known details of municipal sanitation, and specific recommendations are made to meet the local conditions in Sydney based upon the principle that plague is diffused by rats.

He proves, as conclusively as anything can be proved by circumstantial evidence, that the disease reached Sydney through rats brought by vessels from Noumea, where plague was known to exist. The facts, which are carefully worked out in his paper, appear to show that some connecting link between rats and man is wanting, and that the hypothesis that the infection was conveyed by a suctorial insect infesting the rat and transferable to man would not fit the facts very well.

The destruction of rats is going on in all the larger cities of Japan. In Osaka the local sanitary association has supplemented the efforts of the government, which pays 5 sen (2½ cents) for each rat destroyed, by issuing to those receiving this reward a sort of lottery ticket, which will, perhaps, after a time, entitle the holder to a considerable prize. The results of this measure are marked, as it is reported that, since April 1, 50,000 rats have been killed in Osaka alone. The health authorities in Tokio, in their efforts to suppress the plague, have offered a bounty for the killing of rats in the infected district, with the result that over two hundred thousand of the rodents were destroyed in the course of two weeks in June. As an additional measure, infected buildings covering nearly half an acre were burned.

Hankin, in 1897, in India killed rats and mice by inoculating them with the excreta of ants (*Monomorium vaslator*) which had previously devoured rats dead of plague.

Otaga discovered the bacilli of plague in fleas caught upon rats which had died of plague, and is of opinion that such fleas may convey infection by their bites.

The German plague commission in 1897 proved, by inoculating the contents of fleas taken from rats dead of the plague into a guinea-pig, that these fleas contained virulent bacilli.

Simond found that fleas taken from rats and transferred to human subjects proceed to suck the blood of the latter. This is an important point, as it is denied by many that rat fleas will bite man. He further found bacilli in fleas taken from rats dead of plague, which presented the microscopical appearance of plague bacilli. He therefore, as a result of his investigations, reaches the following conclusion : 'That the different forms of so-called spontaneous plague in man and animals are usually to be attributed to parasites,' and he thinks that this theory explains the prevalence of plague especially in filthy localities.

Nuttall criticises Simond's views as hypothetical and inconclusive, and wisely remarks that more facts and fewer opinions are needed, and that the facts can be gathered only by further experimental research. His own experiments with fleas and bugs were negative.

The question, then, as to the manner in which the plague is conveyed from rat to man cannot as yet be said to have been definitely decided. Flies may, and probably do, transmit the disease, and Simond's parasitic theory of conveyance has many strong points in its favour. This much, however, is undeniably true—that rats are in themselves a danger to the world at large as propagators of the plague, and it would also seem that to them is due the widespread nature of the pestilence and its occurrence in out-of-the-way places.

A year ago Danysz described the bacillus which he had found, and the attempts he had made to exterminate rats by wholesale infection with the organism. Recently Kister and Köttgen have published the account of their work upon this bacillus. The bacillus itself is short, thin, and very motile ; it differs from the *B. coli communis* in not producing indol or coagulating milk, and from the *B. pestis* in that it does not show the polar staining so characteristic of this latter organism, and that it produces gas from glucose-containing media. They have confirmed Danysz's results concerning the pathogenicity for rats and mice, and find that after three or four passages through rats the bacillus begins to lose virulence ; after ten such passages its virulence has disappeared. The bacillus is without effect upon birds, cats, dogs and guinea-pigs. When a rat is allowed to eat bread soaked in a culture of the bacillus, and placed in a cage containing other rats, upon its death the carcass is eaten by the other rats, who then die with the lesions typical of the disease. The experiments appear to have been made to determine how soon the bacillus ceases to kill when the rats acquire the disease by eating their fellows. When the bacillus was kept in the horseflesh bouillon suggested by Danysz for four weeks the virulence had disappeared, but when grown upon agar at 10° C. or 23° C. the virulence did not disappear for several weeks, but there was a progressive decrease. The lesions produced by the bacillus in rats and

mice were those of a septicæmia with marked engorgement of the spleen ; the glandular affections produced by the *B. pestis* were absent. The difficulty of its application on a large scale will be to find a method of enhancing and maintaining the virulence of the laboratory cultures.

Apropos to the above the recent experiments by Rosenau on the Danysz virus for the destruction of rats, in the hygienic laboratory of the Marine Hospital Bureau, are less encouraging. The rat, as we now well know, is a special plague victim, unfortunately for us as well as for himself, and he has the peculiar habit of developing the disease and introducing it to mankind. Anything, therefore, that can lessen this possibility is to our advantage; one of the most obvious ways, if practicable, would be to find some disorder that could decimate or extirpate these parasites and would be harmless to man. Such a one appeared to possibly exist in the Danysz culture of what seems, from Rosenau's study, to be the bacillus *typhi murium* of Lœffler, a microbe frankly pathogenic for certain smaller species of the Muridæ, the common house mouse and others. It was naturally inferred, therefore, that it might also have similar effects on the larger species, and Danysz, by a patient cultivation of the organism, claimed he had produced the desideratum. Rosenau's experiments, however, made on caged animals under specially favourable conditions for infection, do not justify those claims. He finds that only the ingestion of large amounts of virus by the rodents is fatal, and smaller quantities are uncertain and often produce an immunity to even extreme doses. The infection has but feeble power of propagating itself from rat to rat, and this being true its efficiency is in a great measure lost. In many respects it acts like a chemical poison, with the advantage that it is harmless in men and domestic animals, so far as known, and with the disadvantage that it produces an immunity.

The experience of Dr. Arthur Krausz does not lead him to the conclusion which has been drawn by Danysz that this bacillus can be used as a means for the wholesale extermination of rats. He made several series of experiments. In the first he fed a rat upon bread soaked in a culture of the bacillus, and then placed it in a cage with 19 healthy rats. The bacillus-fed rat died in eleven days, and by the end of sixteen days 8 had died, but no symptoms of Danysz disease could be seen, nor could the organism be recovered from the cadavers. A second experiment was undertaken in which 19 rats were confined in one part of a cage shut off by a shutter from the other part, which contained one bacillus-fed rat. The latter died in ten days, the last of the 19 died on the twenty-seventh day ; all post-mortem and cultural results were negative. A third experiment was performed on the lines of the first—the bacillus-fed rat was allowed to mix with the healthy ones, but no kind of epidemic was produced, even when the rats were kept short of food and had to eat their dead. The death of the healthy rats Dr. Krausz considers to be due to the fact that rats do not thrive in confinement. He agrees with Danysz that when the bacillus is inoculated into the peritoneal cavity the rats die with the typical lesions, and that the bacillus may be recovered from the cadaver. Despite this pathogenicity when inoculated into the peritoneal cavity no comparison can be drawn between the action of Danysz's bacillus upon rats and that of Lœffler's *B. typhi murium* upon mice. It is evident, however, that we will have to look farther for an efficient ally in our crusade against that objectionable rodent, the rat.

Prophylactic and Curative Serums.—With regard to Haffkine's prophylactic fluid for plague, Major W. B. Bannerman, M.D., Superintendent Plague Research Laboratory, Bombay, states :

Dr. Calmette is reported to have given it as his opinion that a person in the period of incubation for a slight attack of plague would find the disease considerably aggravated if he submitted during this period to a preventive inoculation of Haffkine's vaccine. The case would almost certainly end fatally.

The same opinion is again urged in the third Harben Lecture, lately delivered by Calmette in London, and the advice given to refrain from inoculating those in direct

contact with a plague case, though the measure is recommended as a means of immunising a population living round a plague centre.

As Haffkine, on the contrary, has all along maintained that inoculation with his vaccine is harmless in the incubation period of plague, and that this method of protection should be pushed with the utmost vigour amongst those immediately in contact with plague cases, it becomes necessary to examine this matter afresh, in the light of the extensive experience gained in India and elsewhere in the use of the plague prophylactic.

Calmette's ideas have been derived from laboratory experiments, for he has had no opportunity of studying the effect of plague vaccination during an epidemic among human beings. In India, on the contrary, hundreds of thousands of persons have been inoculated with Haffkine's plague vaccine, and evidence has been now accumulated with sufficient accuracy to enable one to refute entirely the above suppositions of Calmette.

The remedy which we owe to Haffkine's genius, and which has passed successfully through the ordeal of examination by the Government Plague Commission, would be shorn of half its usefulness if it could not be used with perfect safety in the very presence of plague itself.

But in addition to this the table furnishes interesting evidence in support of another of Haffkine's contentions, namely, that the prophylactic begins to act beneficially after a lapse of twenty-four hours only. This pronouncement he first tentatively gave out after a study of the effect of inoculation in the House of Correction at Byculla, Bombay, in January, 1897 ; and a study of cases where—as at Undhera, for instance—the inoculations were all performed at one time, shows that this opinion is correct. In such cases the incidence of plague in the two groups is easily compared, though the same information may be equally derived from communities where operations are not all performed at one time. In all cases where a plague-stricken community has been divided into halves—one inoculated and the other not—and where accurate observations have been kept, it is found that the difference between the two portions has begun from the day following the operations.

Yersin's anti-plague serum was tested in Reunion. The report was made by Dr. G. Merveilleux, principal medical officer of the colony, and head of the sanitary service. Towards the end of November, 1900, an unusual mortality was noticed among rodents. The first undoubted case of plague in man occurred on December 1, but doubtful cases had been observed on November 19 and November 29 ; the last case was notified on February 13, 1901, and on February 20 occurred the last death. In all 67 cases were observed, of which number 53 occurred at the port, where two areas became infected. There were 29 cases in December, the same number in January, and 7 in February. The majority of the persons attacked were Creoles, 48 altogether, of whom 31 died ; 13 Indians were attacked, and 9 died ; 4 Malagassees, 1 Chinaman, and 1 Kaffir were also attacked, and all died. Of the 53 cases observed at the port, 35 were of the bubonic form, and 6 of the pneumonic form, but 4 of the bubonic cases were complicated by pulmonary symptoms, and the general mortality there was 71·69 per cent. Yersin's serum was used either by hypodermic or intravenous injection in 15 out of the 53 cases at the port ; 9 of these so treated recovered, a death-rate of 40 per cent, whereas of the 38 not so treated 32 died, a death-rate of 84·21 per cent. Of the 6 cases treated by Yersin's serum, one, a case of plague pneumonia, had been ill for more than twenty-four hours, and died fourteen hours after the injection ; another, suffering from multiple complications, had been ill for more than forty-eight hours, and died one hour after the injection ; in a third the treatment was stopped, but the patient survived ten days after the last injection ; in a fourth case the patient had been ill for more than three days, and died thirty hours after the injection. Dr. Merveilleux therefore points out that in only two cases treated with the serum under favourable conditions did death ensue ; in one of these death appears to have been due to the toxin, for a search for the bacilli after death resulted in the discovery of only a few organisms ; in the other, when the inoculation was begun on the third day, cardiac

complications already existed, and death ensued thirteen hours after the injection. In this case also very few bacilli could be found.

A. Lustig, professor of pathology, Royal University, Florence, and G. Gabotti, professor of pathology, Royal University, Cagliari, claim good results from a curative serum and a prophylactic prepared by their methods. Of their prophylactic they say :

Acording to our method this is based on the following principle; to inoculate, as a preventive medium, the substance which is alone able to cause in the organism treated an active immunity produced by the action of a specific bactericidal power. This we obtained by isolating from the microbes the nucleo-proteid of which they are partly composed, for it is to this that immunity is due, although it can be also produced by injecting entire cultures of plague microbes.

And of their curative serum:

As the above-mentioned nucleo-proteid is the only substance capable of determining a specific bactericidal power in animals treated, we use the serum of such animals (after a sufficient treatment) as a curative medium. The question of the existence of specific extracellular toxins produced by the plague microbes is still very much debated. The question of the antitoxic capacity of the serum is even more uncertain, as nobody has yet succeeded in obtaining an antitoxic serum by means of the injection of filtered cultures deprived also of those toxic elements which constitute the protoplasm of the bacterial cells.

Through the injection of this nucleo-proteid, which is an intracellular specific poison, we confer on the serum of the animals treated with it a bactericidal power, and very likely an antitoxic one against the same. Balfour's assertion that 'a horse treated with a nucleo-proteid extracted from the dead microbes would be immunised with even less efficiency than one treated with the killed microbes together with their metabolic products' is theoretically unfounded, and as it does not spring from any principle of experience and practically is not true, for the results obtained from our serum are far better than those given by other serums experimented in India.

Viability of the Plague Bacillus.—In his 'Preliminary Note on the Viability of the Plague Bacillus,' published as a bulletin of the Hygienic Laboratory of the Marine-Hospital service P.A. Surgeon M. J. Rosenau gave the result of his observations on the viability of the plague bacillus on various fabrics and substances and under varying conditions of temperature and exposure to light, presence of moisture, &c. He arrived at the conclusion that the prolonged existence of the organism was dependent upon the presence of moisture more than upon any other one factor. He showed, for instance, that at room temperature (20 to 27 C.) the organism lived in the presence of moisture for 60 days on crash, linen, woollen or silk fabrics ; that it lived 96 days in distilled water ; 97 days in ordinary tap water, and for the remarkable period of 125 days upon bone dust, where the presence of moisture was assured by wetting the substance with bouillon, and carefully stoppering the container to prevent evaporation. Since the time of publication of the preliminary note, the experiments have been continued in the laboratory for a period of over a year, and have only recently been concluded. Certain food stuffs were experimented on, but the fact developed that symbiosis with saprophytic organisms was prejudicial to the prolonged life of the bacillus, and that the substances must be subjected to a preliminary sterilization, in order to favour the growth of the plague bacillus. On cheese thus prepared, it lived for 13 to 17 days; on sterilized rice for only 3 days; on dried salt beef, 3 days; on orange peel there was no growth; there was no growth on dried figs and raisins, though this was subsequently proved to be due to the amount of grape or fruit sugar contained. In many of the cases of prolonged survival, however, the virulence of the organism was lost at a comparatively early period, 62 days being the longest period after which the organism was fatal to mice. Rosenau also quotes Yokote, of Tokio, as to the effect of the presence of organisms of decomposition on the existence of plague, showing in the case of the bodies of mice dead of plague that the higher the temperature, the more

the decomposition and the greater the number of saprophytes, and that with lower temperatures the reverse obtained.

Dr. Rosenau has published the results of his experiments as 'Bulletin No. 4 of the Hygienic Laboratory':

(1) The bacillus pestis is not a frail organism. It resembles the hæmorrhagic septicæmic group or the cocco-bacilli as far as its viability is concerned.

(2) Temperature is the most important factor in the viability of the plague bacillus. It keeps alive in the cold, under 19 degrees C., a very long time. It dies quickly, especially when dried, at the body temperature, 37 degrees C.

(3) Moisture favours the life of the bacillus pestis. It usually dies in a few days when dry, even in the presence of albuminous matter, provided the temperature is above 30 degrees C. It may keep alive and virulent when dry for months in the cold, under 19 degrees C.

(4) Sunlight kills the organism within a few hours, provided the sun shines directly upon the organism and the temperature in the sun is over 30 degrees C. The effect of sunlight is not very penetrating.

(5) The virulence of the bacillus pestis is often lost before its vegetability.

(6) It is unlikely that new dry merchandise would carry the infection. The organism usually dies in a few days on the surface of objects such as wood, saw-dust, bone, paper, &c.

(7) Clothing and bedding can harbour the infection for a long time and may act as fomites. The bacillus lives for months when dry in albuminous media at temperatures under 20 degrees C.

(8) Food products may carry the infection of plague. The bacillus lives a long time in milk, cheese and butter. It usually dies quickly on the surface of fruits and prepared foods.

(9) The organism may live a long time in water, although plague is not a water-borne disease.

(10) The plague bacillus does not live long on paper, and first-class mail is therefore not apt to convey the infection.

(11) The colder the climate the greater the danger of conveying the infection on fomites—clothing, bedding, food, merchandise, &c.—and more extensive disinfection is required in such a climate in combating the disease than in tropical regions.

(12) The plague bacillus is destroyed by sulphur fumigation and by formaldehyde gas in the strengths in which these disinfectants are usually employed. The gases can only be depended upon as surface disinfectants. In disinfecting ships, warehouses, dwellings, and other places infested with rats, fleas, and vermin, sulphur is better than formaldehyde, because formaldehyde gas fails to kill the higher forms of animal life.

(13) A temperature of 70 degrees C. continued a short time is invariably fatal for the plague bacillus. The ordinary antiseptics are all efficacious in their usual strength for nonspore-bearing organisms. Efficient surface disinfection may be accomplished by exposing objects all day to the direct sunshine on warm days. The temperature in the sun must be above 30 degrees C.

Small-pox.—This disease has threatened us throughout the year, on the Atlantic and the Pacific coasts and from the neighbouring republic across the border. Its continued presence in the United States has necessitated the maintenance of frontier medical inspectors and guards at those of your unorganized inland quarantines where the threatening seemed the most serious from time to time. In addition to this we have been called upon to handle an outbreak of small-pox in the North-west Territories, the sanitary administration of which Territories was transferred to you by the Hon. the Minister of the Interior, at the beginning of April last. By your instruction Dr. James Patterson, of Winnipeg, was sent out to the Territories to take medical charge of the small-pox outbreak. He went first to the Edmonton district and then to Regina where he continued the work in harmony with the North-west government and in accordance with the provision of the Territorial Health Ordinance.

This work, frontier and territorial, has called for your employment of some sixty additional quarantine officers.

Dr. Patterson, in the territories, performed his onerous duties most satisfactorily. By his excellent work and that of his assistants, the outbreaks in the different parts of the territories were promptly and efficiently handled and controlled.

The frontier quarantine on the White Pass and Yukon Railway at Log Cabin, for the protection of northern British Columbia and the Yukon Territory, was again established and maintained.

On the frontiers much good was accomplished by straining out actual cases by inspection, and protecting by vaccination the unprotected who have been exposed, and thus doubly limiting the importation of fresh centres of infection into the midst of our people.

Partly on account of small-pox in the United States generally, and partly on account of plague in San Francisco, the suspension has been continued of your ministerial order which excluded vessels from San Francisco and United States ports north of it from the quarantine regulations.

And on the Atlantic side, owing to the recent increase of this disease in New York and the New England States, the exclusion from the quarantine regulations of vessels from New York and United States ports north of it has been similarly suspended.

In the United States, this disease has prevailed throughout the year. The Public Health Reports officially published at Washington, give the total of cases actually reported between January 1 and June 30 this year, as 30,710, and from July 1 to the end of this month, as 13,226. Owing to the mildness of the type these figures may be assumed to be far from exhaustive, as many, many cases were not reported at all. Still they give a fair idea of the epidemic nature of the present visitation of the disease.

Of the 30,710 cases reported during the first six months of this year the deaths only numbered 552, the very small average of not quite 1·80 per cent. Of these 1,376 cases, and 235 deaths were in the City of New York, where possibly they may have been of a different and more severe type introduced by the numerous foreign immigrants arriving at that port. Deducting these New York cases, there remains for the rest of the country a total during the six months of 29,334 cases, with only 317 deaths, or an average mortality of only 1·08 per cent.

Since July 1, in the 13,226 cases reported, there have been but 431 deaths, an average of 3·26 per cent. Here again 562 cases and 148 deaths were in New York. Outside of that city in all the United States there have been reported since July 1, 12,664 cases with 283 deaths, an average mortality of only 2·24 per cent.

Philadelphia and Boston are also ports of immigrant arrivals. In the former city there have been since July 1, 292 cases and 32 deaths. In Boston, 79 cases and 7 deaths. The total number of cases in these three ports of immigrant arrival, New York, Philadelphia and Boston would therefore be 933 and the deaths 187, an average of 20 per cent. This leaves for all the United States, except these three cities a total of 12,283 cases since July 1, and only 254 deaths, the very low proportion of about 2 per cent.

In the fourteen states, bordering on Canada, from Alaska to Maine, inclusive, there are at present 8,728 reported cases.

The threatening and the presence of even this mild form of the disease interrupt and interfere with trade and commerce, travel and traffic. It is not, however, an unmixed evil. Many may pass through its lenient hands without much illness, pitting or mortality. Many, very many more will be vaccinated for fear of it.

Between the two classes a large proportion of the people of Canada should be rendered immune to small-pox. And so for some years the Dominion may be safe from any severe epidemic of this disease.

Small-pox has been reported from very many places and countries during the year. The most marked outbreaks were in Naples, with 1,311 cases reported between June 10 and September 7. Glasgow last spring with 1,527 cases. Paris with 543 deaths, the largest number of deaths from small-pox registered in Paris for nineteen years ; and the present outbreak in London, England. Commenting on the London small-pox situation the *British Medical Journal* of September 14, says :

Though the last published figures of the number of cases of small-pox admitted into the hospitals of the Metropolitan Asylums Board show a considerable decline, it would, we feel confident, be a mistake to found on this any very sanguine expectation that the outbreak of small-pox in London is coming to an end. In the eight weeks ending September 7, 135 cases of small-pox were admitted into hospital, and of this number 113 were admitted during the last three weeks of the period ; the number for the week ending August 24 was 30 cases, August 31, 52 cases, September 7, 31 cases. It would be rash to assume that the decline shown last week will continue, and, as a matter of fact, we learn that in the first three days of this week 25 cases were notified, 6 on Sunday, 10 on Monday, and 9 on Tuesday. The cases admitted during the last eight weeks have not been limited to any one part of London ; they have come from St. Pancras, Wandsworth, Marylebone, Bethnal Green, Islington, Hackney, Southwark, Paddington, Hammersmith, Lewisham, Westminster, Hampstead, Holborn, Finsbury, Chelsea, Stoke Newington, Lambeth and Kensington. This alone, by the mere multiplication of foci of infection, constitutes a source of danger.

But there is another point with regard to the present position of London which must give cause for anxiety : it is that the number of unvaccinated children has been steadily increasing for some years past, and is now undoubtedly very large. Dr. Climson Greenwood, the President of the Society of Public Vaccinators, has put down the proportion of unvaccinated children in elementary schools as one-third, and there are grounds for believing that this estimate is not excessive. We find, on reference to the last report of the Medical Officer to the London County Council, that the proportion of children unaccounted for in respect to vaccination has increased steadily since 1888. In that year it was 10·3 per cent of total births ; in 1892 it had risen to 18·4 ; and in 1897, the last year dealt with in the report, to 29·1. The number of persons over 10 years of age vaccinated in infancy who have not been revaccinated must also be very large, and will swell the percentage of the population of London specially liable to contract small-pox and to suffer from it in a severe form.

The same paper also remarks :

One fact in which some degree of satisfaction may be found under existing circumstances is that small-pox has evidently lost none of its influence as an incentive to vaccination. It appears that several months ago the corporation of Glasgow, foreseeing the possibility of an epidemic, advertised free vaccination and revaccination, but with very little result. Cases of small-pox were then very few, and, in the absence of the legislation which the government led us to expect in 1898, there was no sufficient stimulus towards accepting the municipal offer. Now that the danger is becoming more urgent, now that small-pox cases have mounted into hundreds, and that deaths are mounting into scores, revaccination is being largely resorted to in Glasgow, so that a very considerable section of the population must already be protected; indeed, no fewer than 240,000 revaccinations are recorded since the beginning of the outbreak. One of the advantages of calf lymph is that the available stock can be so quickly multiplied as to prove rapidly sufficient for the most extensive demands. If reliance had now had to be placed on humanised lymph taken from the arms of infants, the hurried revaccination of Glasgow would have been almost impossible.

In connection with this extensive revaccination (240,000) Dr. Chambers in a report to the corporation of Glasgow, after discussing the numbers of cases and their distribution in the city, gives a very reassuring statement in regard to the efficacy of revaccination as shown by the present experience of Glasgow. The statement, avowedly made to meet the efforts of the antivaccinists to discountenance the

value of revaccination, is that no case had been admitted to hospital where successful revaccination had taken place prior to the contraction of the disease. It is also added that, in cases where persons had been vaccinated while the disease was incubating, the severity of an attack so far from being increased, might be greatly modified.

The *Cincinnati Lancet-Clinic* prints a letter from Dr. E. Stover in answer to an anti-vaccinationist as follows:

'1. No historical fact is better established than that, before the discovery of vaccination, small-pox was one of the most fatal and dreaded scourges which afflicted humanity. It swept over Europe, leaving death, devastation and terror in its path; indeed, so widespread was the disease that, as the historian Macaulay informs us, it was a rare thing at one time to find a person in London not disfigured or marked by that dread disease. To-day small-pox is one of the rarest diseases, and scarcely figures in mortality statistics. You say this reduction has been brought about by sanitary science, whatever you may mean by that, because if vaccination is not one of the most effective sanitary measures the world has ever seen, I do not know what you would designate it. 2. The English, German, French or American soldiers who have been properly vaccinated can be brought face to face with small-pox in the unhealthy tropics, in places reeking with filth, and all sanitary conditions much worse than the London described by Macaulay, and these soldiers are almost absolutely immune against the disease. Why is this ? Does the sanitation of the countries from which they come, thousands of miles away, protect these men, in the midst of unnatural and health destroying environments, against a disease which is destroying thousands of acclimated natives ? 3. Why is it, if vaccination does not prevent small-pox, that epidemics of the disease can be brought under control by this means, and by this means alone ? Else why should the bitter opponents of the measure resort to it for safety in the face of danger, as they did in the epidemic in England a few years ago ? 4. I have often thought that through generations of vaccination a vital resistance has been created, and a partial immunity established, so that when small-pox attacks even those who have not been personally vaccinated, owing to the mitigating influence of vaccination in their ancestors, the disease assumes a milder form. 5. As every observer knows, small-pox epidemics nearly always follow comparatively long periods of immunity from the disease, when the people have become careless, neglected to be vaccinated, and there are large numbers susceptible to the disease. 6. But the antivaccinationist holds up his hands in horror, and with a scared look and bated breath calls our attention to the horrible diseases and occasional deaths caused by vaccination. Admitted that syphilis and other diseases have been conveyed, and blood-poisoning caused in rare instances (and they are exceedingly rare, compared with the whole number of vaccinations), still the evil is but a tiny trickling rill alongside the great river of beneficence which this grand discovery has brought to soothe and save suffering humanity. With approved modern methods for the production and marketing of bovine vaccin virus, and proper antiseptic or aseptic precautions in making the vaccinations, even these infrequent accidents ought to be almost entirely prevented. It would be just as fair to formulate an opinion as to the propriety and justifiability of abdominal operations and major surgical operations from their pre-antiseptic and pre-aseptic mortalities as it is to condemn vaccination for accidents and dangers that attended the use of infected virus and careless methods of performing the operation years ago, rather than to judge it by the results following the use of pure bovine virus and aseptic operating of the present time. 7. Then, too, a method which has passed through the ordeal of more than a hundred years of the closest investigation and most searching criticism, which has received the unqualified approval and support of nearly all scientific physicians in the whole civilized world, which has lifted the dark cloud of terror which paralyzed humanity so that the great majority of people have come to regard the once dread disease as an insignificant danger ; when, I say, any preventive measure has accomplished such results as these, he is, indeed, a bold man who will advocate its discontinuance, unless he has something better to offer

in its place. 8. I have often thought that, with the great benefits and small dangers of vaccination so generally recognized, and its benefits established on such a firm foundation, it was largely a matter of supererogation to resort to such severe measures in warding off small-pox. The persons who will not protect themselves against the disease do not have "common sense" enough to enjoy good health, and should be left to their fate.'

With regard to this statement of the case one or two remarks suggest themselves. In section 4 the writer refers to a possible partial immunity established even in the unvaccinated through their succession to generations of the vaccinated. Observation does not confirm this. The severity of the attack still depends upon the condition of the individual as to his or her own personal vaccination. The recently vaccinated escape, many with old marks take it lightly, but in the unvaccinated the confluent form with deep pitting or death still occurs as always. The doctrine of an inherited immunity is a dangerous one, tending to the neglect of vaccination and revaccination under a false sense of security.

With his last sentence I agree. Certainly adult sufferers from small-pox are unworthy of pity. But I would go further and contend that as even one case of small-pox causes so much disturbance, mental distress, and pecuniary loss in a community, as it is an entirely preventable disease, and as the means of prevention are readily within the reach of all, having the small-pox should be constituted a misdemeanour, punishable by fine or imprisonment or both. No man has the right to voluntarily become a public nuisance, and bring commercial and other injuries upon his community.

Much of the opposition that still is to be found here and there against vaccination may be attributed to two causes : the occasional occurrence of small-pox in one who has been unsuccessfully vaccinated and the occasional occurrence of a purulent sore (a bad arm), following the little operation. Assuming that the vaccination has been properly performed with good vaccine, neither of these results should occur in healthy persons. It cannot be forgotten, however, that the production and sale of vaccine is a commercial enterprise. And when a large demand arises there must at least be the temptation, in default of an adequate supply of the best, to issue some stock that may have been laid aside, or to take from a calf a larger amount than the vesicles can furnish, and thus send out a mixture of lymph and purulent matter. And in the case of glycerinized vaccine, to issue it too early. I do not say that the best firms do this. But the temptation must arise to do so, rather than to decline to fill orders however large and let them be diverted to competing firms. The solution of this difficulty and the entire removal of any such suspicion in any case of failure or of abnormal inflammation, would, in my opinion, be the preparation of all vaccine at a national laboratory by salaried government officers, and its issue under a government stamp. I would recommend the extension of this to include the preparation and issue of the various prophylactic and curative fluids and serums. Tuberculin, Haffkein's plague preventive fluid, and the anti-toxins of plague, cholera, diphtheria, anthrax, &c. There would then be no temptation for commerical or financial reasons for the issue of inferior material, and the maximum protection and confidence of the public could be attained.

The Germ of Small-pox.—Efforts have for a long time been directed to the isolation of the hypothetical exciting agent of variola and its modifications. Sacco, in 1809, found granules in vaccine lymph; Beale, in 1863, minute transparent or hyaline particles; Hallier and Zurn, in 1867, and Keber, in 1868, micrococci; Chauveau and Burdon-Sanderson, in 1868, minute granular bodies ; Cohn, in 1872, again micrococci ; and since then numerous observers have found different organisms. L. Pfeiffer, in 1887, although he noted the presence of both fungi and bacteria, expressed the belief that the specific agent was a sporozoon. Renault, in 1881, had already described, in the epithelial cells of the vesicles in cases of vaccinia and variola, peculiar bodies that he regarded as parasitic ; and subsequent observers, including also Pfeiffer, have made further studies that strengthen the probability that the cause of these disorders is really a protozoon. It is not unlikely that many of the bodies

described are merely accidental, and experience has amply shown that if they be removed—as occurs in the present methods of preparing glycerinated lymph—the usual unpleasant complications of vaccinia are generally avoided.

The germ of small-pox has heretofore received no general recognition, though the conviction that variola is a germ disease is unavoidable. The latest on this subject is to be found in the *British Medical Journal* for February 23, in which are two communications bearing on this subject. Dr. M. Funck, director of the Institut Sérothérapique, and chief of the bacteriologic laboratory of the University of Brussels, reports the results of his studies in this direction and the finding, in vaccin and small-pox pustules, of morphologically identical organisms which he considers as the cause of vaccinia and variola. These appear under three forms, representing different stages of the same protozoon : 1, an isolated green sphere showing slow movements ; 2, the same infecting epidemic cells, and 3, a morula form consisting of agglomerated sporoblasts ; the last is the one most frequently found in old vaccins, while the first form is more common in perfectly fresh material. The inoculation of these organisms into susceptible animals produced all the symptoms of vaccinia and the subsequent immunity. In the pustules of confluent small-pox the same elements were found and their behaviour will be described in a forthcoming paper. From these facts, Funck concludes that variola and vaccinia are identical, that vaccinia is only the attenuated form of small-pox, and that the immunity it produces is not an exception to the general laws of specific immunity. The discovery of the protozoon is not claimed as a new one, as its presence in vaccin corpuscles was recognized by L. Pfeiffer—in 1887—whose work is highly spoken of by Funck. That bacteria are not the active agents in vaccinia the author considers proved by the fact that he finds vaccin matter after a certain period absolutely free from microbes, though still active, and the pustules thus produced are also themselves sterile. This seems to have some important practical bearings and probably explains the well known better action of ripened vaccin. The second communication is by Monckton Copeman, medical inspector to the local government board in England, who describes zooglea-like masses found in collodion capsule cultures of vaccin lymph sealed up and placed within the peritoneal cavities of rabbits and dogs, the method being the same as that followed by Nocard and Roux in studying the micro-organisms of bovine pleuro-pneumonia. The flueid contents of these capsules was found capable of producing typical vaccinia in the calf. He has since demonstrated apparently similar organisms in genuine small-pox in man. Whether these zooglea masses are the same as the third type of manifestation of the sporozoon of Funck is not entirely clear, but they are described as 'made up of bodies resembling spores, only the periphery of which took the stain.' There is no record of the detection of any actual microbe. It seems possible that we will at least have light thrown on the etiology of this disorder, the first in which artificial immunity was secured, but one of the last so far to evade our search for its germs.

Asiatic Cholera.—This disease continued during the year in its usual habitats, notably in India and China. Limited outbreaks of it occurred also in the Straits Settlements, in the Argentine Republic, in Java and Japan.

Yellow Fever.—The anti-yellow fever serum of Drs. Bellinzaghi and Felipe Caldas has proved inefficacious as a means of prevention or cure. The special commission presided over by Major Harvard, chief surgeon in Cuba, which was appointed to investigate this serum reported adversely to it.

An abstract of the interim report of the commissioners sent out by the Liverpool School of Tropical Medicine has been issued. It is as follows :—

1. Sufficient research reveals the presence of a fine, small bacillus in the organs of all fatal cases of yellow fever. We have found it in each of the 14 cadavers examined for the purpose. In diameter, the bacillus somewhat recalls that of the influenza bacillus ; seen in the tissues, it is about 4 micromillimeters in length.

2. This bacillus has been seen in kidney, in spleen, in mesenteric portal and axillary lymphatic glands, &c., taken from yellow fever cadavers directly after death. In the contents of the lower intestine apparently the same bacillus is found often in extraordinary preponderance over other micro-organisms. Preparations of the pieces of mucus, which are usually, if not always, present in yellow fever stools, at times may almost present the appearance of pure cultures.

3. Preparations of the organs usually fail to show the presence of any other bacteria, whose absence is confirmed by the usual sterility of cultivation experiments.

4. It is probable that this same bacillus has been met with but not recognized by 3 other observers. Dr. Sternberg has mentioned it, and he has also recorded the finding of similar organisms in material derived from Drs. Domingos Freire and Carmona y Valle, but he did not recognize its presence frequently, probably on account of the employment of insufficiently stringent staining technique.

5. It is probable that recognition has not been accorded to this bacillus by reason of the difficulty with which it takes up stains (especially methylene blue), and by reason of the difficulty of establishing growth on artificial media.

6. The most successful staining agent is carbolic fuchsin (Ziehl), diluted with 5 per cent phenol solution (to prevent accidental contamination during the long staining period) immersion for several hours, followed by differentiation in weak acetic acid. Two hours' staining may fail to reveal the bacilli, which appear after twelve to eighteen hours. The bacilli in stools are often of greater length than those in the tissues, and they stain rather more easily ; naturally the same is true of cultures.

7. Since the bacilli are small and comparatively few in numbers they are difficult to find. To facilitate matters at our last necropsies (14th and 15th) a method of sedimentation has been adopted. A considerable quantity of organ juice is emulsified with antiseptic solutions, minute precautions against contamination and for control being taken ; the emulsion is shaken from time to time and allowed to settle. The method is successful and may form a ready means of preserving bacteria containing material for future study. The best fluid for the purpose has yet to be worked out ; hitherto normal saline with about one-fifth per cent sublimate has been employed.

8. Pure growths of this bacillus are not obtained in ordinary ærobic and anærobic culture tubes.

9. Some pure cultures have been obtained by placing whole mesenteric glands (cut out by means of the thermo-cautery), into broth under strict hydrogen atmosphere. Investigations into the necessary constitution of culture media for successful cultivation are in progress.

10. Much search was made for parasites of the nature of protozoa. We conclude that yellow fever is not due to this class of parasite. Our examinations were made on very fresh organ juices, blood, &c., taken at various stages of the disease, with and without centrifugalization, and on specimens fixed and stained in appropriate ways. We may add that we sometimes have examined the organs in a fresh state under the microscope within half an hour after death.

Drs. Walter Reed, James Carroll and Aristides Agramonte, of the United States Army, the United States Commission, under the superintendence of Dr. Reed, which has been making experiments at Quemados, Cuba, on the transmission of the yellow fever germs by the mosquito, has obtained extremely satisfactory results.

Dr. Reed says the experiments show, beyond a doubt, that there is no contagion from an infected person or from infected clothing, but that the mosquitoes alone are responsible for the spread of the disease. In the course of the commission's investigations six non-immune persons were infected direct by the bite of mosquitoes which had previously bitten yellow fever patients, and five of these developed yellow fever.

The last experiment proved conclusively, Dr. Reed contends, the theory of mosquitoes being the intermediary host. A special building was constructed of disinfected material, and one of the rooms was divided into two sections by a wire mosquito screen. In one section were placed disinfected bedding and clothing, and in

the other bedding and clothing from the yellow fever hospital which had not been disinfected.

A non-immune occupied each of the two sections. In one section were put several infected mosquitoes. The patient remained in this room only long enough to be bitten, and in four days a pronounced case of yellow fever developed. The patient is now convalescent. The other subject slept in the infected bedding for many nights and has not contracted the fever.

Two patients have been sleeping for twenty nights in garments worn by yellow fever victims, and in bedding from the yellow fever hospital.

Dr. Reed says they are growing fat and that, in no instance in the course of the commission's investigation, has a case of yellow fever developed from exposure to infected bedding or clothing.

Dr. Reed has published the following conclusions :

'1. The mosquito (*Culex fasciatus*) serves as an intermediate host for the parasite of yellow fever.

'2. Yellow fever is transmitted to the non-immune individual by a mosquito that has previously fed on the blood of those sick with this disease.

'3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.

'4. The bite of the mosquito at any earlier period after contamination does not appear to confer any immunity against subsequent attacks.

'5. Yellow fever can also be experimentally produced by subcutaneous injection of blood taken from the general circulation during the first and second days of this disease.

'6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against a subsequent injection of the blood of an individual suffering from the non-experimental form of this disease.

'7. The period of incubation in thirteen cases of yellow fever has averaged from forty-one hours to five days and seventeen hours.

'8. Yellow fever is not conveyed by fomites and hence disinfection of articles of clothing, bedding, and merchandise, supposedly contaminated by contact with those sick of this disease, is unnecessary.

'9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes, capable of conveying the parasite of this disease.

'10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes, and the protection of the sick against the bite of these insects.

'11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.'

The reports issued monthly by Major W. C. Gorgas, Chief Sanitary Officer, on the health conditions in Havana, continue with their unvarying statements of lessening mortality.

From April 1 to October 1 of this year, yellow fever caused only five deaths in Havana, as compared with 659 in the corresponding period of 1897, and an average of 296 deaths for the past eleven years. As accounting for the great improvement in the condition of public health, Major Gorgas says : 'This year, since March 1, we have had one hundred men daily engaged in killing mosquitoes in every way we know how. The result is that, instead of having fifty-two deaths from yellow fever and thirty-two from malarial fever, we have had two deaths from yellow fever and eleven from malarial fever—a difference of seventy-one deaths, under those two heads, in favour of this year.

As to yellow fever,' Major Gorgas writes, 'there has never been an approximation to this condition at any time in the last one hundred and fifty years. This is the first year, during that period, in which we have known that yellow fever was conveyed by the mosquito ; and during February the Military Governor directed

that our disinfection be carried out on these lines. I attribute our very surprising results to this fact. As each month passes, we feel more and more confident that the problem of the control of yellow fever has been solved by the discovery that the mosquito is its conveyor ; and little anxiety is now felt when a focus developes in the city. From repeated successes in the last six months, we believe that, with present disinfection methods, any infection from yellow fever that may be introduced into the city can be stamped out.'

Beri-beri.—The cause of that mysterious tropical disease, beri-beri, appears to have been at last discovered. Captain E. R. Rost, I.M.S., civil surgeon of Meiktila, Burma, has been investigating the connection between beri-beri and a microbe found in rice and Jowari grain, and in the rice liquor which coolies and sepoys drink. He concludes that this microbe is the cause of the disease. But he is not the first to make this suggestion. In May of last year, Mr. Charles Hose, D.Sc., who is not a medical man, but a naturalist, who has contributed largely to the national museums, has handed to Dr. Strangeways Pigg, of Cambridge, a paper in which he stated the results of investigations which he had been carrying on for some years in Borneo. He had suffered from the disease and it was mainly to this circumstances that was due his attention to the subject. He found that in Borneo the disease was much more prevalent among men than among women, that it was frequently contracted on a journey in the jungles of the interior, was more prevalent at certain seasons, and frequently occurred in outbreaks among Chinese coolies. The women in Borneo, who very rarely leave the villages for any length of time, live mainly on freshly husked rice, while the men are frequently absent in the interior on rubber-collecting expeditions for several months, and live on rice, which they carry in bags, and which becomes mouldy in the damp climate. Similarly the rice supplied in jails has been kept in bags for considerable periods, and is often mouldy. By miscroscopic examination Mr. Hose found a fungoid growth on this mouldy rice. He then tried the experiment of feeding three monkeys (*macacus nemestrinus*) on old rice. Two of the three developed the characteristic nerve symptoms of the disease, but not the characteristic edema of the legs. Thirty-nine Dayaks, who had contracted beri-beri during their expeditions were placed in villages where only freshly-husked rice was used, 33 recovered and 6 died. On the other hand, of 128 who continued to live on imported rice 47 died. Mr. Hose has forwarded to Cambridge specimens of this mouldy rice for examination.

It is reported that beri-beri has broken out among the Chinese coolies employed in Christmas Island, which owing to its isolation has only recently become inhabited. This offers a unique opportunity for the scientific study of the disease. The Christmas Islands Phosphate Company, Billiter Street, E. C., has offered the sum of £1,000 to the London School of Tropical Medicine towards the expenses of a scientific expedition to the Christmas Islands for the investigation of beri-beri. Sir John Murray has offered to contribute £100 for the same purpose, and there is reason to believe that the Colonial Office will also make a grant in aid of the expedition. The Christmas Islands Phosphate Company has offered a passage to members of the expedition on board a steamer which will leave London on September 30, and Cardiff on October 4, calling at Port Said fourteen days later. The committee of the school has not yet finally selected those who are to take part in the expedition.

Inoculation against Enteric Fever.—Although the subject is being industriously investigated, it cannot be said that a final opinion has been reached as to the utility of protective inoculation in the prevention of typhoid fever. Statistics of a favourable character have in the past been published, and the most recent announcement in this connection points in the same direction. Prof. A. E. Wright (*Lancet*, February 9, 1901, p. 399), of the Army Medical school at Netley, makes, through the kindness of Lieutenant-General Sir George Luck, the statement based upon official compilation that of 539 officers, men and women connected with the Fifteenth Hussars at Meerut, India, 360 received protective inoculation in England against typhoid fever and 179 did not. Of the former 2 (0·55 per cent) were admitted to the hospital, suffering from tpyhoid fever,

with 1 death (0·27 per cent) ; while of the latter 11 (6·14 per cent) were attacked by the fever, with 6 deaths (3·35 per cent). As is well known, figures cannot under all conditions be implicitly relied upon, but in the present instance there seems to be no good reason to deny their validity or dispute the inferences that they irresistibly compel ; so that the conclusion seems amply warranted that the reduction in incidence of, and mortality from, the disease in the inoculated, was, in some degree at least due to the measures employed.

Dr. H. M. Cullinan, reporting on an outbreak of enteric fever in the Richmond Asylum, Dublin, which occurred in the autumn of last year, gives the following results :—

	Average Strength.	No. of Cases.	No. of Deaths.	Percentage of Cases.	Percentage of Deaths.
Uninoculated.	298	30 (— 1?)	4	10·1	1·3
Inoculated...	339	5 (+ 1?)	1	1·5	0·3

Wright gives also the following statistics dealing with the incidence of enteric fever and the mortality from the disease for the year 1900 in the inoculated and uninoculated among the British troops in Egypt and Cyprus :

	Uninoculated.	Inoculated.
Average annual strength.....	2,669	720
Number of cases of enteric fever.....	68	1
Number of deaths from enteric fever.....	10	1
Percentage of cases calculated on average annual strength....	2·5	·14
Percentage of deaths calculated on the same basis.	·4	·14

These figures testify to a nineteenfold reduction in the number of attacks of typhoid fever and to a threefold reduction in the number of deaths from that disease among the inoculated.

Henry Cayley believes that the statistics of the work done in South Africa offer very strong evidence in favour of the protective power of the antityphoid inoculation when this is very carefully performed, and that there is probably necessity for two inoculations at a suitable interval. During the period of five months that the hospital was stationed at Kroonstadt there were ninety-two admissions for enteric fever and eleven deaths. Of these ninety-two patients, fifteen said they had been inoculated, a few were doubtful, and about seventy had not been inoculated. Of the eleven who died, one had been inoculated once, the others had not been inoculated. From these figures probably no conclusions or even reliable inferences can be drawn, but it seems positive from the cases observed that the attacks of enteric fever were, as a rule, much milder in the inoculated than in the non-inoculated, and the duration of the disease was much less.

Tuberculosis.—In view of the urgent importance of meeting with some concerted action the ravages of this disease, which recent scientific investigations have done so much to expose, a Canadian Tuberculosis Conference was summoned to meet in Ottawa in February last, under the patronage of their Excellencies the Earl and Countess of Minto. As a result of this kindly action on the part of His Excellency the Governor General, the Canadian Association for the Prevention of Tuberculosis has been formed.

At the opening meeting a series of resolutions were submitted, and amongst them the following :

2. Resolution No. III.

Whereas, the Constitution of the Dominion of Canada especially delegates to the federal government general quarantine in matters of public health, both of men and animals, as well as matters of statistics; and in view of the fact that in tuberculosis we are dealing with a disease which not only lessens national prosperity through the loss of lives, but also by enormous expenditure through sickness and loss of labour.

Resolved, that it is the view of this Conference that in a disease whose influence extends from questions of the inspection of immigrants to that of imported cattle, and affects the output of our farms and our factories, the federal government may greatly assist in the fight against tuberculosis by—

1. Preventing the entrance into the country of tuberculized immigrants, and tuberculized cattle.

2. Arranging with the Registrars General of the provinces for a system of Federal Health Statistics of deaths.

3. Establishing a Sanatorium in each of several typical Canadian climates, where under careful medical supervision the therapeutic effects of dry or moist, high or low, forest or prairie climates may be scientifically studied, and the results published for the information of the general public.

4. Arranging with the railway companies to provide special facilities, both as regards conveyances and rates, for the transportation of tuberculized patients to such Sanatoria.

In the discussion on these resolutions I spoke as follows :—

'I am glad to have this opportunity of joining with previous speakers in the expression of appreciation of the importance of the subject of this conference, and in the hope that substantial and practical good may arise from it. I am glad to have this opportunity both in my private capacity as a physician, and in my official one as Director-General of Public Health and Sanitary Adviser to the Dominion Government.

The resolution now under discussion contains the proposition that the federal government may greatly assist in the fight against tuberculosis by preventing the entry into this country of tuberculised passengers.

Tuberculosis is a communicable disease. Therefore it is not desirable that cases of it should be imported, to become possible fresh centres for its diffusion amongst our people. These are propositions that are theoretically unquestionable and unassailable. Their recognition has given me anxious thought and study for years past. The theory is simple and easy. The crystallizing it into rules and regulations presents difficulties. Some of these I may briefly bring before you.

If tuberculous persons are to be quarantined or sent back where amongst them are you to draw the line ? Is the advanced case, with cavities and hectic fever, that is soon to cease to be a menace, to be held ? And is the beginning case, with a little prolonged expiration and thickening at an apex, that may develop into a danger for several years, to be allowed to freely enter ? Are all to be held ? or where between these extremes are you to draw the line ?

Then if you master that preliminary difficulty and succeed in finding some satisfactory criterion or standard of judgment, how are you going to apply the tests ? Vessels come to our ports on both oceans with hundreds of passengers on board. Are they to be detained until their chests can be percussed and auscultated and their expectoration examined microscopically ? This could hardly be done. And yet if not how is a trustworthy knowledge of their condition quoad tuberculosis to be obtained ?

Then if you have caught your tuberculized passengers, what are you going to do with them ? Our quarantines and quarantine hospitals are adapted for the short detention of acute infectious cases until they cease, by death or recovery within a time limited by weeks at the longest, to be a danger to the public health. But if we add tubercul-

osis to the list of quarantinable diseases our quarantine stations will soon be filled with incurable cases of this disease to the practical exclusion of all others.

If tuberculous persons are to be refused admission to the country, deported and sent back, where again are you to draw the line ? and how decide between different cases or stages before informing a family that one of the young daughters, we will say, is tuberculous, and must stay on board of, and go back by, the ship in which she came?

Moreover, if tuberculized persons are not to enter by our seaports, a similar law must logically prevail to forbid their entry all along the international frontier between us and the United States. And how is that to be carried out and enforced ? And yet with such a law for our seaports and not for our frontier, tuberculous or doubtful cases need only ship to Portland or Boston, instead of Montreal or Halifax, and for Astoria or San Francisco instead of Victoria or Vancouver, and then come over the frontier by rail unchallenged. Thus our transportation companies would be injured without any protection to the country. Not being an island we can only move in these matters *pari passu*, with our southern neighbours.

Withheld by such considerations as these I have not yet been able to see my way to submit to my government any proposal to include tuberculosis amongst the quarantinable diseases. Of course as far as immigrants from Europe and from Asia are concerned it is evident that the place to examine and detain for tuberculosis would be not at the port of arrival but at the port of departure.

It might possibly be done during the days immediately before sailing. And of course stopping an individual or a family from sailing from the port of departure would not entail such hardships as the being sent back from the port of arrival after having crossed the ocean.

In my private and unofficial character I may perhaps be allowed to add that I look forward with hope to the day when Canada will have her Dominion Department of Public Health, with its medical officers responsible to this government in every passenger shipping port in Europe and in the Orient, for the inspection, vaccination and disinfection of intending immigrants to this country.

When that day comes something may be done for the culling out from amongst them, during the days before sailing, of tuberculized persons, likely—if allowed to enter the country—to become an additional menace to its public health.'

Knopf says to call tuberculosis a 'dangerous, contagious disease' is unscientific, and not only tends to increase a useless fear in the minds of the public at large, but will add terrible hardships to the sufferings of the unfortunate consumptive. Pulmonary tuberculosis can only be called a highly communicable disease, and should never be classed among the acute infectious and contagious diseases.

To come in contact with a clean conscientious consumptive, who takes care of his infectious sputum, is not dangerous. In sanatoria and special hospitals for consumptives contagion is well nigh unknown.

Tuberculous passengers on steamers and railways.—This subject has been much discussed of late, and various methods have been recommended to prevent the dissemination of tuberculosis by a railway passenger suffering from the disease. Dr. George Chaffee, surgeon to the Long Island Railway, writing in the *Railway Surgeon* for July, 1901, suggests, among other safeguards, the following precautions : (1) To instruct the public in methods of prevention ; (2) co-operation with boards of health ; (3) the enactment of proper legislation, both state and national. 'A national law protects the various seaport towns of this country, and ever stands to support our health officers whenever they find it necessary to quarantine cases of small-pox, cholera, and yellow fever. Why should not a national law as well give tuberculous passengers the right to ask for a private room, or a compartment of a car—which is only another name for it—and also notify railway corporations to have these private rooms, or compartments, ready for immediate use when needed ; thus protecting healthy passengers from infection, disease, and an untimely death. The railway men of this country

stand at the head in the matter of business intelligence and enterprise, and I am satisfied that they will be found ready and willing to carry out their part of any legislation that may be enacted for the prevention of tuberculosis. It would seem to be only just and right that there should be national legislation on this subject, whereby railway corporations might be requested to furnish compartment cars and at points near health resorts entire sanitary cars, and which would oblige tuberculous passengers to occupy such compartments, and to comply with all the requirements of such a law. Such a law should provide for the disinfection of every compartment or sanitary car at the end of every run, if it has been occupied by a tuberculous passenger, and a record made and filed of the disinfection.

In July last, I attended as a delegate of the Canadian government the British Congress on Tuberculosis. Upon my return I had the honour to submit to you the following report :—

Some 2,500 British and foreign delegates accepted the invitation to the Congress on Tuberculosis which His Royal Highness the Duke of Cambridge opened on July 22, on behalf of the King. These delegates included many of the most eminent pathologists and physicians in the world ; they represented the new science in medicine and surgery. Two years ago the then Prince of Wales, as president of the National Association for the Prevention of Consumption, nominated some of the delegates who went to Berlin to take part in the first congress on consumption, and it was then impressed on the British representatives that a similar meeting in London was greatly to be desired. His Royal Highness at once gave his sanction, and agreed personally to become president of the congress. The death of the Queen and his ascent to the Throne alone prevented the carrying out of this programme.

Apart from the usefulness of the congress in affording an opportunity to experts to exchange their views on the subject, much good may be expected from the interest which the congress has aroused generally. 'Government of the people by the people for the people' is the present-day principle of legislation. Until the public has been adequately instructed in the risks incurred under present circumstances and the possibilities afforded by hygiene and medicine, it is useless to expect any demand to arise for the legislation and expenditure which those who are best fitted to speak declare to be necessary to stay the scourge. It is to be hoped that the lessons of the congress will spread far beyond the limits of the volumes of its transactions. As to the arousing of public interest, it is a good omen that His Majesty has always been keenly alive to the need of further effort, and that the first year of his reign has been signalized by a congress on a subject so vital to the interests of the nation. And that the Governor General of Canada has also caused the formation of, and consented to preside over, a Canadian association for the prevention of this disease.

Great stress was very rightly laid upon the curability of the disease, if taken in time. It was advocated, however, that to secure such early treatment it would in many cases be requisite to render aid to the dependents in addition to treating the patient. One advantage accruing from such procedure is that the patient, freed from anxiety for his family, would enjoy a much better hope of recovery. The need of increased efforts in routine sanitary administration was not forgotten. All are agreed upon the possibilities for good in the amelioration of the housing of the poor. Almost as much importance also is to be attached to the proper supervision of tenement houses as to the clearing of unhealthy areas.

All speakers agreed in regarding human sputum as the chief vehicle of tuberculous infection amongst the human race. The modern education of consumptive inpatients at hospitals and sanatoria, and the printed directions distributed in outpatient departments show patients how they may—by the control and destruction of their expectorations—avoid infecting their relations and friends.

In short general hygienic knowledge in regard to the nature and prevention of tuberculosis is being gradually published amongst all classes in civilized countries. Yet it is not likely that infection by sputum can be suppressed so long as it remains

the popular custom for persons, healthy or unhealthy, to spit in the streets, in omnibuses, in railway carriages, and on the floor of waiting rooms, &c.

In his public address before the congress, Professor Brouardel, of Paris, dwelt specially on the evils of this deplorable habit of spitting.

'The danger is in the sputum, which contains thousands of contagious germs. To expectorate on the ground is a disgusting and dangerous habit. Once this habit has quite disappeared, tuberculosis will decrease rapidly.'

Gradually in all countries the public are beginning to realize that personal care and cleanliness are necessary to obviate contagion, and are also realizing that other idea, equally important, that a consumptive patient is only dangerous if the necessary precautions are not taken around him, and if he himself does not take them to protect his relatives, friends and fellow-workmen from contagion.

The generally accepted beliefs that tuberculosis is not hereditary, and that it is not necessarily incurable were also again dwelt upon in this congress. With regard to heredity, Professor Brouardel dismisses it with the phrase: 'On ne naît pas tuberculeux mais tuberculisable. And stress was again laid upon the importance of the open air treatment, with rest and generous diet, in the treatment of the disease.

It will probably be generally admitted that the feature of the congress was the address by Dr. Koch, more particularly that part dealing with the alleged non-identity of bovine and human tuberculosis and the non-transmissibility of the disease from the one to the other species. The author's position and reputation are such that the greatest consideration should be accorded to any opinion expressed by him, no matter to what extent his pronouncements may be at variance with previously accepted doctrines or experience. In the present case Dr. Koch has startled the scientific world by declaring that the bacillus of bovine tuberculosis is not the same as that of the human disorder, that the bacilli from the latter will not infect the former, and that there is practically no real danger of any transmission of infection from tuberculous cattle to man.

His actual words in this connection were :

'Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of the infection by the milk and flesh of tuberculous cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.'

On the other hand, the current view and practice of local sanitary authorities in England have been in accord with the unanimous findings of two royal commissions (the first containing such experts as Sir G. Buchanan and Sir J. Burdon-Sanderson, and the last the late Sir Richard Thorne and Mr. Shirley Murphy).

In paragraph 11 of the last commission's report they say: 'We have had before us the unanimous finding of the Royal Commission on Tuberculosis, which reported in 1895 to the effect that tuberculous disease in bovine and other animals is identical with that in the human subject, and that it is communicable from one to the other, though the manifestation of the disease differs in some respects in the human subject from that in the lower animals. We have also considered their finding that 'any person who takes tuberculous matter into the body as food incurs risk of acquiring tuberculous disease.' Nothing that has come before us in the course of our inquiry has raised any doubt in our minds as to the accuracy of this opinion.' The views of the two commissions and those of Professor Koch are thus absolutely contradictory.

Yet the identity of human and bovine tuberculosis is ordinarily imagined to rest on Dr. Koch's own discoveries, when he found, and proclaimed to the world, that the lesions in man and those in animals contained bacilli absolutely alike in general and special characters. If this be the case, the assumption that baccilli can be transmitted from one organism to the other is, à priori, reasonable and likely, and the growing

conviction on this point has never been seriously contested for the last eighteen years. Ordinary experience seems also to confirm this view. Dr. Koch points out the fact that, according to the hitherto recognized theory of transmission, cases of infection from milk ought to be exceedingly common, whereas instances of primary intestinal tuberculosis are extremely scarce. Here, however, there are observers who would meet him with a direct negative. Cases of specific bovine infection may be relatively rare, but there are a good many recorded.

If Dr. Koch is right, we shall all rejoice, and, therefore, we must earnestly hope that he is. But the question is, can his theory be safely accepted ? That can only be decided by an examination of the facts on which it is based. No authority however great, can lay down a law in science by the mere weight of his opinion, and, with all due respect to Professor Koch, he is not altogether free from the suspicion of having jumped somewhat too hastily to conclusions in regard to other matters. The feeling throughout the congress seemed to be that Dr. Koch's statements were made prematurely, and upon insufficient data, and that, should they prove to be wrong, the amount of harm done may be incalculable. The evidence which he brought forward in support of his views by no means carried conviction to his hearers. One of these, at least, enjoys an eminence equal to his own. Lord Lister, who occupied the chair, spoke with no uncertain voice in this matter. While paying a generous tribute to his colleague, and to the profound interest of his paper, he pronounced the argument not conclusive, and declared that the question must be probed more deeply before the congress would accept Dr. Koch's hypothesis. It would, he said, be a grievous matter if the efforts now being made to secure the purity of milk and meat supplies should be relaxed, and then it should turn out, after all, that the danger was real. It is not usual to have a discussion on an address delivered before a general meeting, and the importance attached to the question by the chairman was sufficiently shown by his calling on several other members to speak upon it. Professor Nocard, the highest veterinary authority in France, Professor Bang, of Denmark, an equally distinguished expert, and Dr. Sims Woodhead, Professor of Pathology in the University of Cambridge, all responded, and spoke in the same sense as Lord Lister. Lord Lister said that, in Dr. Koch's address there was one point of special interest-namely, the relation between human and bovine tuberculosis. This was a matter of the most enormous importance, for if Professor Koch was right, prevention would be greatly simplified ; but on the other hand it would be a serious and a grievous matter if the efforts being made to secure purity of milk and meat supplies should be relaxed and then it should turn out that after all bovine tuberculosis was dangerous to man. He confessed that the evidence produced by Dr. Koch of the incommunicability of human tuberculosis to animals appeared to him very conclusive, but it did not at all follow that bovine tuberculosis was incommunicable to man, and on that point he thought the evidence was not conclusive. There was a reason for thinking the contrary, and he instanced tuberculous infection of the mesenteric glands in children. In view of the enormous importance of the question the matter required to be probed more deeply before the congress would give its consent to this hypothesis. He was sure that those present would wish to hear the opinions of other authorities and therefore he would call upon Professor Nocard.

Professor Nocard, who is the leading authority on veterinary medicine in France, expressed his sense of the honour paid him and his pleasure in joining in thanking Prof. Koch for his admirable address. Speaking as a member of the veterinary profession, he referred to the movement they had recently had to encounter from exaggerated fears of the danger connected with animals ; and perhaps there would be a reaction too far in the other direction. He thought they ought neither to exaggerate the danger nor deny its existence. He then pointed out that the facts related by Professor Koch might be explained by the modification which microbes undergo from their environment. With regard to incommunicability from animals to man, veterinary surgeons were not infrequently inoculated from bovine disease by accident, and there were many other

examples of similar inoculation. He also referred to the facts brought forward by the late Sir Richard Thorne in his work on 'The Administrative Control of Tuberculosis.' Sir Richard Thorne had shown that tuberculosis had been diminished in England 50 per cent by sanitation, but there was one form of the disease that was an exception, namely, the abdominal tuberculosis of infants, or tabes mesenterica, and the sole reason why that had not diminished was that the infection was derived from tuberculous milk. He agreed with the chairman in desiring further inquiry.

Professor Bang, of Copenhagen, was then called upon by the chairman, and said that he thought Professor Kock had gone a little too far in saying that there was no necessity for taking measures against bovine tuberculosis. He had proved that there was very little danger in inoculating cattle from man, but the inoculation of man from cattle was a different matter, and they should be cautious in accepting his conclusions about it.

Professor Sims Woodhead (Cambridge) was also called upon. He said that Professor Koch's paper was a masterly exposition of his subject, but the very weight of his word going out to the world made it desirable that, if there was anything to be said on the other side, it should be known too. He was himself convinced that bovine tuberculosis did play some part in the extension of the disease, and he adduced several reasons for his opinion. Among them he referred to an experiment of Professor Crookshank's, and said that one such positive result outweighed a large number of negative ones. Professor Koch had told them that a commisison had been appointed in Germany to make further investigations, and he suggested that the same should be done in England, and that the Minister of Agriculture should be approached with that object in order that the question might be settled by actual experiment. But for the present he strongly urged that they should continue to take precautionary measures.

On the day following Professor Koch's speech the general address was delivered by Professor Brouardel, Dean of the Faculty of Medicine of Paris, the leading sanitary adviser of the Freneh government, and one of the highest authorities upon sanitary matters in Europe. On the question of the moment his views are diametrically opposed to those of the German bacteriologist.

Among other things he said :

'In our food danger lurks. Since Chauveau showed that it was possible for tuberculous germs in food to produce tubercles in the intestinal tract, attention has been turned to precautions for preventing the consumption of meats and milk from tuberculous animals. As far as meat is concerned, surveillance of the slaughter-houses in large towns achieves this. In Belgium this measure is also made to apply to the country ; but I do not know of any other kingdom where private slaughter-houses are inspected, and in them it is that phthisical cows, measly pigs, and diseased animals of any kind are slaughtered, and are able to escape inspection. This injurious food is consumed either as fresh meat, or in the forms of pâtés or sausages from which the tuberculous viscera have not been removed. With no wish to exaggerate the danger of the propagation of tubercnlosis by meat, it cannot be overlooked. That the milk of cows with tuberculous inflammation of the udder is used is very clear. Your great hygienist, Dr. Richard Thorne, while pointing out that in England mortality in general of adults from phthisis has diminished since 1850, 45 per cent, regrets to see that from the same date infantile mortality from tuberculosis increased by 27 per cent. According to him, this increase is entirely due to tuberculosis in the abdomen, caused by ingestion of contaminated milk in infants under a year old ; for in England cow-houses are not inspected. It is well to add that in large concerns the milk from different sources is mixed and one cow only need be the victim of tuberculous udder in order to contaminate all the milk with which its milk is mixed. To prevent this method of propagation, strict inspection measures should be adopted, such as have been in use for several years in Denmark, Sweden and Norway, to the great advantage of public health. Until such necessary measures are actually adopted, there only remains the simple mode of avoiding risk from milk by boiling it, and this should be widely

made known, in spite of a too wide-spread prejudice, which wrongly holds that boiled milk is less nutritious and indigestible.'

The next day the third and last general address was given. It was by Professor John McFadyean, the head of the Royal Veterinary College at Camden Town. He summarized Dr. Koch's theory as follows :—

(1.) That human and bovine tuberculosis are not identical ;

(2.) That human tuberculosis cannot be transmitted to cattle ;

(3.) That the transmission of bovine tuberculosis to man is so rare that it is not necessary to take any precautions against it.

Professor McFadyean began by pointing out the unanimity of opinion on the identity of the two forms of disease, and upon the fact of their intercommunicability. He agreed with Dr. Koch that bovine tubercle bacilli were, as a rule, distinctly more virulent for cattle and other domesticated animals than human bacilli, and that the results of experiments indicated that in natural circumstances there was little danger of cattle becoming infected from human beings. But Professor McFadyean joined issue with Dr. Koch on his other postulate, viz., the rarity of the transmission of bovine tuberculosis to man. He reminded the congress that the majority of disease-exciting bacteria were harmful to only one or two species, but all those that were common to all the domesticated animals were also pathogenic to man.

The only proposition in Dr. Koch's argument that was really germane to the point at issue was that only cases of primary intestinal tuberculosis could possibly have had their origin in infected milk or meat, and that 'such cases were extremely rare.' If all the statistics relating to this point were unanimous, it would have to be admitted that primary intestinal tuberculosis was rare in the human subject, and that cases of infection through milk were still rarer, though even then it might be advisable to take steps to prevent the few cases. But the statistics were by no means unanimous, and those that were likely to appeal with most force to the people of England were not at all in accord with those quoted from Germany. During the last few years the evidence obtainable from the post-mortem records of two of the largest hospitals for children in Great Britain had been analysed with great care, to see what evidence they afforded as to the relative frequency of the different methods of infection in tuberculosis.

In the case of the Royal Hospital for Sick Children in Great Ormond Street, this had been done by Dr. George Still, and in the case of the Royal Hospital for Sick Children, in Edinburgh, by Dr. Shennan. The conclusion at which Dr. Still arrived was that in 29 1 per cent of the cases of tuberculosis in children primary infection appeared to have taken place through the intestines. That was very far from being an insignificant proportion, and it was a striking fact that Dr. Shennan arrived at an almost identical conclusion, and estimated that 28·1 per cent of the cases of tuberculosis among children in Edinburgh were due to alimentary infection. In face of these statistics it was not possible to assent to the statement that cases of primary tuberculosis of the alimentary canal were extremely rare. Precisely the contrary conclusion was the one that must, in the meanwhile, be drawn with regard to the state of affairs in Great Britain, viz., that at least in children primary infection of the alimentary canal was comparatively common. Professor McFadyean proceeded to examine very carefully the danger through the sale of milk, quoting the late Sir Richard Thorne, to the effect that the loss of child life through the use of tuberculous milk was 'appalling,' and summing up his conclusions on the whole case in the following passage :

The danger cannot be defined by stating how many persons are thus infected annually, or what fraction the persons thus infected form of the total number who contract tuberculosis in the course of a year. At the same time, it is impossible to doubt that the danger is a very real one, since at the present time milk is a vehicle by which tubercle bacilli are often introduced into the bodies of human beings.

Professor McFadyean then dealt with the means of averting the danger, maintaining that the ideal method of counteracting this source of human disease would be to

stamp out living tuberculosis, or to prevent the sale of milk from every cow that was tuberculous.

And he ended his address with the following words:—

'In conclusion I would venture to express the earnest hope that the congress will not endorse the view that it is inadvisable to take any measures to prevent the transmission of tuberculosis from the lower animals to human beings. To justify the introduction of measures to that end it is not necessary to contend that this is a common method of infection or that the danger arising from milk can for a moment be compared with that present in human sputum. The inhalation of tubercle bacilli expelled from the bodies of human patients is doubtless the great cause of human tuberculosis, and every practicable means of preventing infection in that way ought to be employed ; but, at the same time, we ought not to concede to the milkmen the right to sell us tubercle bacilli, even if we were assured that—like Dr. Koch's experimental pigs—we had nothing to fear beyond the development of little nodules here and there in the lymphatic glands of our necks and a few gray tubercles in our lungs.'

Professor Virchow in an interview reported from Berlin, under date July 26, says he has for years fought against the idea of the hereditary transmission of tuberculosis. He disagrees, however, with Professor Koch's deductions with regard to bovine tuberculosis and its transmission to man. Professor Koch, Dr. Virchow says, has quite ignored the investigations of the Copenhagen school and the results they have obtained.

It will be clearly seen from the foregoing that the position of all these eminent authorities who criticised Dr. Koch's announcement was essentially uniform.

They deprecated a hasty conclusion, on inadequate evidence, and gave weighty reasons for differing from Dr. Koch ; they pleaded for further investigation, and urged the continuance of the present preventive measures until the issue has been decided. There is no doubt that this is the wise course to adopt. Professor Koch would, probably, say the same himself. In fact, he suggested that his experiments should be repeated in order that all doubt might be removed. It seemed to be generally considered a pity that he has given this marked publicity to theories of such importance while any doubt remains.

Meanwhile is it unreasonable to take the position that presumption should be against the consumption of milk from other than healthy cows, and that meat and milk plus disease products, tubercle bacilli, or what not, is not of the quality and nature reasonably expected by the purchaser from the vendor, or that we desire to use and to give to our children ; and that while doubt exists no relaxation of measures directed towards ensuring its purity should be permitted ?

Science will achieve a useful work if she imbues us with a wholesome dread of tuberculous meat and milk and other harmful food, although it may be that tuberculous food has in no case set up tubercle in any healthy person. Pasteur, in studying the diseased silkworms, traced the evil to a microbe, but far the more valuable and suggestive outcome of his researches was the discovery that so long as the silkworms were in health they laughed and waxed fat on the microbe. Only when they deteriorated in condition and suffered from digestive derangement could the microbe enter in and devastate them.

Professor Koch's failure to induce tuberculosis in healthy animals by means of feeding them on a tuberculous diet is only another illustration of the fact that health is a weapon whereby the microbe, whether of tuberculosis, of diphtheria, or of any other disease, can be successively combated. The indication and the duty of modern science, therefore, is to raise by all possible ways of sanitation, legislation, and by the spread of knowledge, the standard of health.

Other matters of importance that engaged the attention of the congress were the questions relating to the claim for notification of phthisis, and for power to compel the disinfection of infected houses and articles ; the proposals for public aid not only for the tubercular breadwinner himself but for those non-infected persons who are dependent upon him ; consumption hospitals ; and sanatoria.

With regard to consumption hospitals and special consumption wards in general hospitals it was urged that if only a considerable fraction of the whole number of consumptives were suitably lodged in this way, a diminution of infection and consequently of the sum total of tuberculosis could not fail to be the result.

In regard to the modern sanatorium, Koch allows that by careful selection of cases it will be possible, if the duration of treatment be prolonged, to cure 50 per cent of patients, or perhaps still more. The total effect, however, he is convinced, will always remain moderate. Be this as it may, it must in fairness be remembered that it is largely owing to the sanatorium movement that the present great international interest in the tuberculosis question has arisen. To the managers of private sanatoria, though they have by some been slightingly compared to hotel-keepers or hotel managers, is due much of the credit for the great advances which have been made during recent years in our knowledge of the whole subject of the treatment of consumption. In the struggle against tuberculosis the importance of improving the general health of weakly children of the poorer classes by the establishment of charitable seaside sanatoria and holiday colonies, as referred to by Professor Brouardel and Sir Hermann Weber, cannot be overlooked. This is indeed a timely method for rendering the human soil unsuitable to the bacillary growth.

As a delegate representing Canada, in an address before the State Section of the Congress, I spoke of the present conditions in the Dominion as to tuberculosis, and the measures being taken towards its prevention and cure. I drew attention to the fact that these measures—until recently only the action of boards of health, of medical societies, of comparatively small associations, and of individuals—have this year been widened and extended into a great national movement by the action of Lord Minto, His Excellency the Governor General, in organizing and setting in motion the Canadian Association for the Prevention of Tuberculosis, of which he is the Honorary President.

I referred to the sanatoria already in existence and at work amongst us ; and to the recent legislation of some of our provinces towards the establishment of provincial and municipal sanatoria. And I pointed out how admirably our climate, with its dryness and clearness of atmosphere, is adapted for that open air treatment which is now universally admitted to be the most important factor in the hoped-for cure of this disease.

The final meeting of the congress was held on July 26, with the Earl of Derby in the chair. The following resolutions were unanimously adopted :—

1. Tuberculous sputum is the main agent for the conveyance of the virus of tuberculosis from man to man. Indiscriminate spitting should therefore be suppressed.

2. All hospitals and dispensaries should present every out-patient with a leaflet on the prevention of consumption and insist on the use of a pocket spittoon.

3. Notification of tuberculosis should be established, when possible. If compulsory notification is impracticable, voluntary should be encouraged.

4. The provision of sanatoria is an indispensable part of measures for the diminution of tuberculosis.

5. Medical officers of health should use all their powers and relax no effort to prevent the spread of tuberculosis by milk and meat.

6. In view of the doubts thrown on the identity of human and bovine tuberculosis, the government is requested to institute an inquiry into the subject.

7. The educational efforts of the great national societies for the prevention of tuberculosis are deserving of support.

8. A permanent international committee should be appointed to report on the measures for the prevention of tuberculosis in different countries.

9. Overcrowding and defective ventilation, damp and unsanitary dwellings of the working classes diminish the chances of curing consumption, and are predisposing causes of the disease.

10. The attention of governments and charitable persons should be called to the necessity for establishing anti-tuberculous dispensaries.

Under orders from the Minister of Agriculture to the Hygienic Institute of the Berlin Veterinary College, the head thereof, Ostertag (*Zeitschrift für Fleisch und Milchhygiene*, ix., pp. 168 and 221), undertook an investigation of the virulence and specific bacterial content of milk of cows, which, though reacting to tuberculin, show no clinical evidence of tuberculosis. Separate samples and the mixed milk of fifty cows were tested by bacteriological examination, intraperitoneal inoculation of cream sediment, and feeding experiments with guinea-pigs, of which animals during the inquiry no less than 526 were used. Individual samples from forty-nine cows, which simply reacted to tuberculin, yielded no bacilli. From his results Ostertag concludes that the mixed milk of larger herds, which react without clinical evidence of the disease, may by chance contain bacilli without being able to any noteworthy extent to produce tuberculosis by ingestion; and, further, that the milk of cows which give no clinical evidence may be considered as quite harmless. But with the milk of those with affected udders, and of those which have become emaciated, the case is quite different. In no secretion of tuberculous cows are the bacilli so numerous as in that of the tuberculous udder. The most important measure for the prevention of dissemination of tuberculosis through the agency of milk is the weeding out of all cows with involved udders and of those which show emaciation, and this should be done by fortnightly veterinary examination.

After the statements made by Professor Koch at the British Congress on Tuberculosis, it was generally felt that it would be necessary to have another commission appointed to inquire further into the question of the transmissibility of the disease from animals to man, and from man to cattle. Such a commission has now been appointed, Sir Michael Foster, Professor G. Sims Woodhead, Dr. Sidney Martin, Professor John McFadyean, and Professor Robert Boyce being the Commissioners.

Hydrocyanic Acid in Public Health Work.—Drs. Fulton and Stokes have published the following accounts of their investigations of this agent as a disinfectant :—

Under the same conditions as are practically obtained in room disinfection with formaldehyde, non-sporulating bacteria are destroyed by twenty-four hours exposure to hydrocyanic acid gas in amounts equivalent to one gramme of potassium cyanide to each cubic foot of inclosed space.

Hydrocyanic acid is not, however, so useful a gaseous germicide as formaldehyde, being at present much more expensive, far more dangerous and no more effective. Its single advantage is that it may be generated without fire.

The gas is obtained by treating cyanide of potassium with a dilute mineral acid in a stone vessel. Our working formula is :

Potassium cyanide	1·
Concentrated sulphuric acid	1·5
Water	2·25

The acid is first diluted after which the cyanide may be dropped into the acid. By this method the evolution of gas is very rapid, so that we prefer to deliver the dilute acid through a siphon into another earthen jar containing the cyanide.

Its destructiveness of all forms of animal life recommends hydrocyanic acid, especially for ship disinfection in the prophylaxis of bubonic plague, yellow fever and the diseases conveyed by animals and insects.

It is a highly diffusible gas ; having a specific gravity of ·935.

Guaiacum paper wet with 2 per cent solution of cupric sulphate inclosed in test tubes tightly plugged with cotton and exposed in a room to the gas in amounts equivalent to one gramme of cyanide to three cubic feet of space, showed that the gas, generated by the siphon method, could penetrate by diffusion three inches of cotton in five minutes, and nine inches of cotton in twenty-nine minutes.

All animals and insects exposed without protection are destroyed within five minutes.

Insects protected by inclosure in cotton plugged tubes were killed in periods of time varying directly with the depth of the cotton plugs.

Thus roaches were killed in tubes under one inch of cotton within ten minutes, and under nine inches of cotton within one hour.

As compared with roaches, more time is required to kill bed-bugs, ticks and ants, while flies and mosquitoes succumb earlier.

Higher animals, as guinea pigs, rats and mice, are overcome more quickly than insects.

Our notes show that one rat recovered after ten minutes' exposure. By the siphon method, these animals, if unprotected by covering, are overcome within sixty seconds, and are, as a rule, dead within ten minutes.

Our notes show that one rat recovered after ten minutes exposure. By the siphon method the gas may be generated without danger to the operator. Milk, bread and butter exposed to the gas in amounts as high as one gramme of cyanide to the cubic foot do not become poisonous.

The gas has no injurious action upon wood, metals, textile fabrics or paint.

The gas while extremely dangerous, if carelessly handled, is by no means unmanageable.

Disinfection at the Port of Departure.—Since my last annual report this has been put into practice at Hong Kong, under the supervision of the medical officer of the United States Marine Hospital service for vessels for the Pacific ports of the United States. In Public Health Reports of December 28 last the following is reported to the surgeon general by Dr. Kerr of the United States Marine Hospital service who is on duty at Hong Kong :

'The new floating plant was used for the first time, the crews and steerage passengers of two vessels being treated there during the week. The barge, formerly an old sailing ship, is fitted up with a steam chamber 12 feet long and 5 feet in diameter, inside measurement. The chamber, boilers, and bath-room are located between decks, thus leaving the entire upper deck space for the unpacking of baggage. The chamber did very good work, the pressure in the jacket being 40 pounds and in the chamber 20 pounds. Having no provision for obtaining a vacuum, it is necessary to dry the clothing before its removal from the chamber. The sulphur rooms are not yet completed, but they will soon be built on the upper deck. The plant is in charge of Chinese attendants, one of them being recommended to the company by this consulate. This man is directly responsible to the consulate for the character of the work.

'The sulphur room at the Pacific Mail Company's disinfecting station is about completed, and the baggage leaving on the next steamer for San Francisco will be treated there.'

I may here perhaps be permitted to quote a short paragraph from my longer article on this subject of disinfection, &c., at the ports of departure in my annual report for 1897: 'I am, as ever, strongly of opinion that the proper time and place for the routine disinfection of passengers and their effects, and for their vaccination, are before they board the vessel, and at the port of departure. This properly carried out would destroy any infection many days sooner ; would lessen the chance of disease during the voyage ; would lessen the risk to cabin passengers of contracting disease from the steerage ; and if properly certified to might well replace any routine disinfection of healthy vessels—even during epidemics—at quarantine, and so greatly lessen interference with travel and traffic, limiting our quarantine to inspection, and the treatment of actual infection only.'

National Hygienic Laboratories.—By an Act which passed the Congress of the United States, on March 3 last an appropriation of ($35,000), thirty-five thousand dollars was devoted to the establishment of a national hygienic laboratory at Washington. A subsequent Act (July 1, 1901), provided for the establishment of government laboratories for the Philippine Islands, the opening sections of the Act are as follows:—

Section 1. A biological laboratory, a chemical laboratory, and laboratories for the production of vaccine virus and of serums and prophylactics shall be established and maintained by the government of the Philippine Islands.

Section 2. The biological laboratory shall be situated at Manilla, and shall afford adequate facilities for investigation into, and scientific report upon, the causes, pathology, and methods of diagnosing and combating the diseases of man and of domesticated animals, and of animals utilized for food, and of plants useful to man, as well as for such other biological work as may be deemed necessary by the board of health for the Philippine Islands, the forestry bureau, the bureau of agriculture, or any other department or bureau of the government.

Section 3. The chemical laboratory shall be situated at Manilla, and shall afford adequate facilities for investigation and report as to the purity of foods and drinks ; as to the composition and properties of gums, resins, drugs, herbs, or other plant products of known or supposed commercial value ; as to soils or fertilizers ; as to the minerals and minero-medicinal waters of the Philippine Islands, and for such other chemical investigation as may be deemed necessary by the board of health for the Philippine Islands, the department of public instruction, the forestry bureau, the mining bureau, the bureau of agriculture, the customs service, or any other department or bureau of the government.

Section 4. Laboratories for the production of vaccine virus and of serums and prophylactics shall be established and maintained at Manilla and at such other points in the archipelago as the board of health for the Philippine Islands may advise and the central legislative body of the islands may determine upon.

I would respectfully but most earnestly recommend to your favourable consideration the desirability of similar action by Canada to establish a National Hygienic Laboratory at Ottawa. I have referred to this matter above in my remarks upon vaccine against small-pox. To such a national laboratory suspected samples of various kinds could be sent from the different quarantines for the confirmation, modification, &c., of the opinions of the local officers, and definite instructions based on the certain evidence so obtained be wired for the treatment of the vessel, &c., in question. In it vaccines and prophylactic and curative fluids and serums could be prepared and be ready at all times to meet the demand, vaccine, tuberculine, Haffkine's plague-fluid, the serums and anti-toxins for diphtheria, cholera, plague, anthrax, glanders, rabies, &c.

Moreover, this country could then advance from its present position of entire dependence upon others for all information in such directions, and could take a place, worthy of itself and of its great destinies, in original research under governmental control towards the advancement of science, and the consequent benefit of mankind.

Congresses and Meetings.—In addition to my attendance at the British Congress on Tuberculosis as above reported I had the honour to represent the government of Canada at the meeting of the Canadian Medical Association at Winnipeg, August 28-31, and at that of the American Public Health Association at Buffalo, September 16-21.

THE QUARANTINE STATIONS.

Grosse Isle, Que.—At Grosse Isle in the St. Lawrence, and at its substation of Rimouski, 438 vessels have been inspected this year, 407 at Grosse Isle and 31 at Rimouski.

The admissions to hospital were 134; the diseases for which they were admitted were small-pox, scarlet fever, enteric fever, diphtheria, measles and chicken-pox. There have been four deaths : one from small-pox, two from scarlet fever and one from measles. Dr. W. Aylen was appointed assistant medical health officer, vice Dr. Church.

William Head, B.C.—Number of vessels inspected 488. Owing to the threatening of bubonic plague from San Francisco, and of small-pox from the United States generally vessels from San Francisco and United States ports north of it were not of

late excepted from the quarantine regulations. This has increased this year the number of inspections at the three maritime British Columbia inpection stations, William Head, Victoria and Vancouver. Dr. W. H. K. Anderson was appointed as assistant medical officer and bacteriologist at the station in December, 1900. His services are reported by Dr. Watt to have been of great value. Five cases of small-pox were amongst the hospital admissions.

Victoria, B.C.—Number of vessels inspected 1,161.

Vancouver, B.C.—Vessels inspected 471. Disease found, measles. From 50 to 200 tons of Chinese foodstuffs packed in loam or clay arriving in each steamer of the Canadian Pacific Railway Company from plague infected districts have been disinfected at this station.

Halifax, N.S.—Vessels inspected 311. Admissions to hospitals were 11 for enteric fever, 9 for measles, and 21 for small-pox; 4 deaths from small-pox. The small-pox cases were amongst the crews of fishing schooners from Gloucester, Mass.

St. John, N.B.—Vessels inspected 274. The boring for an artesian water supply for this station has had to be abandoned owing to the entrance of sea water at a depth of 609 feet.

Sydney, C.B.—Vessels inspected 119.

Charlottetown, P.E.I.—Vessels inspected 10.

Chatham, N.B.—Vessels inspected 92.

Extra ports and places.—In addition to these regular stations you have this year given the country the additional protection of extra inspecting officers at the following points where from the lack of efficient health organizations to the south of them the importation of small-pox seemed most to be feared. In British Columbia, Log Cabin (on the White Pass to protect northern British Columbia and the Yukon Territory). Huntingdon, Grand Forks, Carson, Cascade, White's Camp, Rossland and Nelson, from Northport, Kettle River district, Midway, Cheesaw, Rykerts and the Tobacco Plains trails. In the North-west Territories: Coutts and North Portal. In Manitoba: Deloraine, Boissevain, Killarney, Crystal City, Morden, Gretna, Emerson and Sprague; in Ontario: Beaver Mills, Mine Centre, Fort William, Port Arthur, Sault Ste. Marie, Bruce Mines, Thessalon, Collingwood, Owen Sound, Chippewa, Erieau and Rondeau Harbour; in Nova Scotia: Digby, Weymouth, Bear River and Clementsport and Yarmouth ; in Cape Breton : Louisbourg. Also at the port of Charlottetown inspections have been authorized of arrivals from Pictou where small-pox occurred. Prince Edward Island is guaranteed quarantine protection even against her sister provinces by the terms of union.

While not expecting or hoping to be able to keep out a disease with a period of incubation of about two weeks as small-pox has, and especially this mild type of that disease which does not as a rule prevent the patient from moving freely from place to place, these extra precautions have done great good. Actual cases of the disease have been kept from entering, the exposed have been protected by vaccination, and the knowledge of the inspection has caused countless travellers from the United States to be vaccinated before leaving for Canada. In these ways great good has been done with a minimum interference with travel and traffic.

The Territories.—In the beginning of April of this year the sanitary administration of the Territories was transferred to you by the Hon. the Minister of the Interior. To take immediate measures for the control of the small-pox outbreak reported from the Edmonton district Dr. James Patterson, of Winnipeg, was at once despatched thither. A little later he was directed to proceed to Regina as the representative of the Public Health Branch of this department, and from thence to take the necessary

measures for controlling and stamping out the various outbreaks of small-pox throughout the North-west Territories, acting in harmony with the North-west government and under its Public Health Ordinance.

Dr. Patterson reported that he found practically all of those born in the North-west Territories during the last twenty years and many others to be unvaccinated, and that some general system had to be adopted at once as the most efficient preventive. The school boards of trustees were the only organized bodies through which this could be accomplished. There are nearly 700 of them. Dr. Patterson advised that each child should produce a certificate or other adequate proof of successful vaccination before being admitted to school after the midsummer holidays. The school ordinance was amended in this particular. Dr. Patterson then had a circular sent to each secretary-treasurer of the school boards, offering vaccine free of cost, sufficient to vaccinate all the unprotected school children and all others under or over school age in the district if the board of trustees would see that it was honestly used. This offer was promptly and willingly accepted and requisitions poured in for over 30,000 tubes.

Since the first outbreak of this disease last winter cases of it have occurred in the following places and districts in the North-west Territories :—

Pincher Creek, Lac Ste. Anne, Cochrane, Edmonton, Touchwood Hills, Cannington Manor, Carlyle, St. Paul de Metis, Macleod, Lethbridge, Onion Lake, Maple Creek, Battleford, Cottonwood, Athabasca Landing, Cardston, Ponoka, Calgary, Regina, Moosejaw, Innisfail and Port Ellice.

Thanks, however, to the energetic and well devised action of Dr. Patterson, aided by the various medical assistants under him the small-pox has been all but extinguished throughout these Territories. Dr. Patterson knows of no cases now except one little bunch north of Edmonton, near the crossing of the Sturgeon, on the Athabasca Landing trail. There it is confined to four families living in three houses close together, and at a distance of about two miles from nearest neighbours. All half-breeds, seventeen individuals, of whom fifteen have had the disease. They are under care of a guard to keep them at home. Dr. Patterson thinks that about November 10 they will be in a condition to be disinfected and set at liberty. A medical man is to go out from Edmonton at that date and see this done.

Public Works Health Act.—Mr. Charles A. L. Fisher, the inspector under this Act has made official visits to the various canals, railways, mines and works of other public companies covered by section 1 of the Act, and coming within the legislative authority of the parliament of Canada. As you will see by his report Mr. Fisher calls attention to the excellent health and condition of all classes of employees on the public works thus coming under your sanitary control. And speaks of the satisfaction expressed by many of them at the passing of this Act, and the enforcing of the Public Health Regulations under it. He states moreover that contractors, railway managers and those in charge of other public works, are taking an interest in the carrying out of the regulations, seeing the advantages gained therefrom.

Tracadie Lazaretto, N.B.—Four of the leper inmates of this establishment died during the year. Two new cases were admitted, both from the district of Shippegan, N.B. The present number of patients is 18, 11 male and 7 female. Dr. Smith reports continued beneficial results in those who persevered in the use of chaulmoögra oil internally with that of creolin externally.

I have the honour to be, sir,

Your obedient servant,

F. MONTIZAMBERT, M.D.Edin., F.R.C.S., D.C.L.,
Director General of Public Health.

The Honourable
The Minister of Agriculture,
Ottawa.

No .2.

(G. E. Martineau, M.D.)

Office of the Medical Superintendent,
Grosse Isle, Que., October 31, 1901.

Sir,—I have the honour to submit my annual report of the St. Lawrence Quarantine Service to October 31, 1901.

Four hundred and seven vessels were inspected at this station during the present year, being an increase of thirty-three over the last year.

The total number of persons examined was 40,270; divided as follows : 2,437 cabin, 3,831 intermediate, 13,998 steerage passengers and 20,004 crew.

Infectious diseases were reported by or found on board the following vessels arriving in the St. Lawrence, named in the order of their arrival : SS. *Lake Superior, Tunisian, Lake Megantic, Brazilian, Lake Champlain, Australasian, Numidian, Sarmatian, Kastalia, Lake Simcoe, Lake Ontario, Lake Manitoba* and *Parisian.* The diseases so reported and discovered were: small-pox, scarlet fever, enteric fever, diphtheria, measles and chicken-pox. All those sick were removed with attendants to the hospital at Quarantine, and the vessels proceeded after having had their hospital disinfected.

Small-pox.—SS. *Lake Superior,* Evans, master, having sailed from Liverpool on April 30, with 109 intermediate and 614 steerage passengers, 27 cattlemen and 107 crew, arrived at the station on May 10, at 10 a.m., with one case of small-pox on board, which had developed four days previous, amongst one of the steerage passengers.

Having made a careful inspection of the rest of passengers that we found all well, we removed the patient to the small-pox hospital, and the steamer having been anchored near the station we began immediately the landing of the passengers and of their baggage.

The vaccination began on the 11th and was terminated on the 13th.

The disinfection of baggages, cloth, bedding, &c., with steam disinfecter and formaldehyde; and the antiseptic baths took place on the 13th, 14th and 15th.

The disinfection of the steamer began on the 11th and was terminated on the 17th, the methods employed being steam, formaldehyde, mercuric chloride solution and sulphur dioxide gas under pressure.

On the 18th a new crew having been sent down from Quebec with tug *Hackett,* took charge of the vessel which had been placed in the offing without any one on board.

The unloading and loading of the steamer's cargo having been completed before the expiration of the period of observation of the old crew, the vessel came down to the station on the 21st in charge of the same crew who had taken her up, and the same precautions were taken when exchanging the crews as on the 18th ; no one of the old crew went on board before all the other crew going up to Quebec with tug *Hackett* had left the steamer.

The passengers and the rest of the crew detained at the quarantine as suspicious, were released after a careful inspection and left the station on May 25 and 26.

The only case of small-pox that we had removed from that vessel and isolated in the small-pox hospital, died of infectious endocarditis (complication of small-pox) on May 17.

On May 31 one of the employees at the station, Captain Couillard, came at my office on official business, and having remarked then that he had some rash on the face. I asked him if he was sick, he replied that he was not feeling sick at all, that he was as usual eating and sleeping well and having no pain whatever ; but that he had had an overheating some days previous and this was probably the cause of that rash, nevertheless, I took his temperature and having found that he had 102° Far., I sent him down to the hospital for observation, and on June 2 next, the rash having increased considerably and showing all the evidences like, I could diagnose then that he had small-pox.

Every precaution were taken in order to prevent the spread of the disease amongst the other people at the station, and no other cases occurrred.

Captain Couillard has fully recovered and he was discharged from the hospital at quarantine on July 30.

This year has been a very busy one at the station, we have had from twenty to thirty patients at the same time in the hospital during all the season, and the total number of persons admitted to the hospital was 134.

The deaths numbered four, one from small-pox, two from scarlet fever and one from measles.

Three steerage passengers were landed from ss. *Numidian* on September 1 on account of having refused to be vaccinated, and they were detained at the quarantine for the usual period of observation.

Bubonic Plague.—SS. *Indian* from Algoa Bay, an infected port, arrived at the station during the night and was detained for inspection at day-light ; everybody on board was well.

Quarantine Staff.—The Rimouski substation continued to be in charge of Dr. A. Lapointe, who made the inspection of the weekly mail steamers. I visited this advance port, and, coming up from thence on the mail steamers, made a detailed inspection between Rimouski and Grosse Isle.

Improvements and Requirements.—I may perhaps be permitted to express here my satisfaction for the great number of works and improvements done at the station during the present year.

Reserve Inspecting Steamer.—I beg leave respectfully to suggest again this year that a new strong steamer with screw be built or purchased, because it is very difficult and dangerous to come alongside the steamers in rough weather and seas with a paddle boat such as *Kathleen.* This new boat should be certainly for the best interest of the station as well as of all those concerned.

Deep Water Wharf.—The fire took by spontaneous combustion into the coal at the upper wharf and caused great damage. The burned coal and the stone which fell from the wharf have diminished the depth of water at that place and rendered it very dangerous for our boats at low water. Since a long time a deep water wharf has been asked, and I think it should be the proper time to lengthen that wharf which should be very convenient to give a shelter to our boats in rough weathers and seas, and to which the infected vessels could be brought to land the passengers and the baggage, &c.

Steam Laundrying Disinfecting Apparatus.—The great deficiency for the hospital continues to be that of one steam laundrying disinfecting apparatus to sterilize the contaminated linen, clothes, bedding, &c., belonging and having served to the sick and attendants in the hospital.

When these three additional appliances (strong reserve inspecting steamer, deep water wharf and steam laundrying disinfecting apparatus for the hospital) will be granted and completed, it will bring Grosse Isle into the foremost rank of quarantine stations of the first-class.

Some other works and repairs are also necessary, the list for which is in the hands of the Public Works Department.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

G. E. MARTINEAU, M.D.,
Medical Superintendent St. Lawrence Quarantine Service.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 3.

(N. E. MacKay, M.D.)

Halifax, N.S., October 31, 1901.

Sir,—I have the honour to submit my annual report of the quarantine station at Halifax, for the year ending October 31, 1901.

The arrival of the troopships *Idaho* and *Roslyn Castle* from Cape Town, South Africa, with the returning Canadian contingents, added more than usual interest to the work of the station during the past year. The former arrived in port on November 1, 1900, with 547 souls on board—all well—and the latter on January 8, 1901, with 933. Two deaths occurred on the voyage from enteric fever and eight were sick with the same disease when the vessel arrived in port.

During the year 311 vessels were inspected—18 less than the previous year. In the same period we examined 2,124 cabin passengers, 2,173 intermediate, 17,078 steerage and 11,237 crew. A total of 30,438 souls.

Minor quarantinable diseases were found on board the following vessels :—SS. *Corinthian*, November 26, 1900 ; one case of enteric fever. SS. *Parisian*, December 6, one case of enteric fever ; ss. *Roslyn Castle*, January 8, 1901, eight cases of enteric fever. SS. *Numidian*, from Liverpool, March 8, one case of enteric fever ; ss. *Lake Champlain*, from Liverpool, March 16, two cases of measles ; ss. *Lake Superior*, from Liverpool, March 28, scarlet fever (child died as vessel was entering the harbour) ; ss. *Lake Ontario*, from Liverpool, April 4, seven cases of measles ; ss. *Lucitania*, from Liverpool, April 12, one child died of measles on the voyage, and the ss. *Sicilian*, from Liverpool, June 5, five cases of measles.

The patients ex-*Parisian* and *Idaho* belonged to the returning contingents from South Africa were taken charge of by the military authorities, and treated in their hospital, and by request the patient ex-*Numidian* was allowed to proceed to Portland. The case ex-*Corinthian* was sent to the V. G. hospital for treatment.

Other diseases were found on the following vessels:—ss. *Vancouver*, November 17, seaman sick with pneumonia; ss. *Noura*, December 3, 1 case of phthisis; ss. *Lake Supe-*

rior, January 13, 1 case of bronchitis; ss. *Numidian,* March 8, 1 case of pneumonia; ss. *Ulunda,* December 8, sailor sick with phthisis; ss. *Ethelhilda* from Antwerp, December 12, sailor with broken leg. All these were sent to the V. G. hospital for treatment.

Eleven deaths occurred on the voyages from various causes, viz. : 2 of enteric fever ; 1 of scarlet fever ; 1 of measles ; 1 of marasmus ; 1 lost overboard (drowning), and 4 from undetermined causes, but not contagious or infectious.

The seven (7) cases of measles ex-*Lake Ontario,* April 4, were sent to quarantine for treatment with the families to which they belonged—in all 21 persons. All the adults were Russian women. They were a very quarrelsome crowd. All the patients recovered.

The five orphan children, ex-*Sicilian,* June 5, were also treated at quarantine station. The oldest of them not being more than 9 years. I had to hire a nurse to look after them. And the two cases of measles ex-*Lake Champlain,* March 16, were allowed to proceed to St. John with the families to which they belonged. They were very mild cases.

With one exception, the apartments occupied on board the vessels by these people were disinfected by us with formaldehyde ; the exception was entrusted to the doctor of the ship.

The graver quarantinable disease, small-pox, was discovered on board three Gloucester fishing schooners, viz. : *Thalia, L. M. Goodwin* and *Essex.* The *Thalia* arrived from Liverpool, N.S., on September 10, with one of the crew sick with small-pox. The case at the time was in the suppurative stage. She had a crew of sixteen. All the well on board had been vaccinated in Liverpool a day or two before the vessel sailed for this port. None of those vaccinations took. The vessel and crew were at once sent to Lawlor's Island, and the crew bathed and their clothing and effects disinfected with hot steam at a temperature of 212 degrees F. for thirty minutes, and the ship with sulphur dioxide and mercuric chloride solution, 1 in 800. All the well were put in an isolated building under observation, and as soon as any of them exhibited febrile symptoms they were placed in a separate building and isolated there until unmistakable evidences of small-pox developed, when they were removed to the hospital. Ten of the crew contracted the disease, six only escaping.

After landing at the station the disease developed amongst the crew of the vessel on the following dates :—September 16th, 3 ; 18th, 1 ; 19th, 1 ; 20th, 1 ; 21st, 1 ; and 23rd, 2. In all 9.

The *L. M. Goodwin* arrived in port on September 20 from the fishing banks with two of the crew ill. They had all the symptoms of the primary fever of small-pox, but there was no sign of an eruption on either of them. However, on questioning the captain closely, I learned that he had landed two of his crew at Canso on September 7, with a peculiar rash, which the local doctor called scurvy. At the time, I was aware that two fellows belonging to an American fishing schooner had been landed at Canso, and had passed through the city and were quarantined at Meteghan, Digby County, for small-pox, so, I at once concluded that they (the sick) were suffering from the prodromal symptoms of small-pox, and ordered the vessel to quarantine. In two days after, the rash appeared. The vessel had twenty of a crew. They were all vaccinated at once and their clothing and effects were disinfected as was also the vessel in the usual manner. One of the crew developed the disease subsequently—September 24.

The schooner *Essex,* from the fishing banks, arrived on September 26 with one man laid up with small-pox. The disease was in the suppurative stage. The man contracted the disease at Canso from the crew of the *L. M. Goodwin,* on September 7. The vessel was sent to quarantine and the crew vaccinated and bathed and their clothing and effects, and also the vessel thoroughly disinfected. Seven of the crew developed the disease subsequently, as follows : 2 on October 4th ; 2 on October 5th, and 3 on the 7th.

The combined crews numbered 55 souls ; of these 21 contracted the disease, viz. : 10 of the crew of the *Thalia* ; 3 of the *L. M. Goodwin,* and 8 of the *Essex.*

Fifty men were vaccinated, and of these 29 took on first vaccination. Four of the crew of the *Thalia* took ill with small-pox within four days of being vaccinated, and one of the *Essex* crew two days after vaccination. On second vaccination we had 14 takes. In a large number of cases the men had badly inflamed arms, with a deep round ulcer at point of inoculation. A large amount of exudation surrounded the ulcer, which was the size of a ten-cent piece ; it had well-defined edges and was fully ¼ inch in depth. The operation was performed with strict antiseptic precaution.

Eleven of the cases of small-pox were confluent ; two modified confluent and eight discrete ; four died—all confluent cases. Death was due in one case to broncho-pneumonia more than to small-pox. With two exceptions not one of the fifty-five had been successfully vaccinated before coming to the station. Mortality about 19 per cent.

The three crews were kept, so far as possible, separate, and each person as soon as he developed any suspicious symptoms was removed to an isolation building and kept there under observation till no doubts existed as to his having the disease. My object in keeping the crews apart was to expedite the release of each vessel, with the well patients of her crew at the expiration of the 21 days of quarantine.

The schooner *Thalia* with six of the crew was released from quarantine on the 2nd day of October ; the *L. M. Goodwin*, with sixteen of the crew, on the 13th, and the *Essex*, with nine of the crew, on the 21st. Each of the vessels was held in quarantine the usual period, 21 days, from date of last exposure. The men discharged were those who had been successfully vaccinated and did not contract the disease. All who developed the disease after reaching the station had it in their system before landing, and none contracted the disease after they had been successfully vaccinated and bathed and their effects disinfected. This demonstrates the efficacy of vaccination as a preventive of small-pox. It is difficult to say whether the vaccination of those who had the disease in incubation, modified the attack, several of them had the confluent type.

On October 23, we discharged 10 convalescent patients from the hospital, and on the same day released three of them from quarantine, and on the 30th the remaining seven. However, before discharging these they were repeatedly bathed in mercuric chloride solution, and were given a needle and shower bath the day they were released, and their clothing and effects were subjected to hot steam for thirty or forty minutes at a temperature of 212 degrees F. Seven patients remain in the hospital at this date. They are all progressing favourably and we hope to have quarantine raised by the middle of November.

When the disease broke out I had a good deal of trouble in getting suitable assistants, indeed I was obliged to take whatever help I could get. The first nurse I hired contracted the disease himself. When I employed him he represented to me that he had had the disease, but for fear he might be mistaken I had him vaccinated. This is the only person who contracted the disease at the station.

By permission the ss. *City of Ghent*, a local coasting steamer, which brought from Canso the two sailors, landed there by the *L. M. Goodwin* with small-pox was disinfected at the station on September 30, and also the crew and the effects. Disinfection was done at the expense of the owners and the city health board.

At one time we had three schooners and one steamer tied up to the wharf at the station for small-pox.

A number of galvanized iron beds arrived at quarantine recently for the use of the new detention building, but they have not yet been put in position.

During the past year a large concrete tank, with a capacity of 40,000 gallons, was constructed on the highest point on the island. This tank has been connected with all the buildings and is intended for flushing purposes.

The following improvements are absolutely necessary : The main wharf should be replanked, and the smaller one at eastern passage side of the island should be repaired, and also the boat-house. We need a coach-house and an ambulance, and two more surface wells—one in the vicinity of the hospital. The framework under the mercuric

chloride tank has given way and needs immediate attention. It seems to me that it would be better to have the framework boarded in and shingled so as to protect it from the weather.

Since my last report the ss. *Argus* has been provided with a new boiler, and her machinery has been thoroughly overhauled and renewed. She is now in good repair.

The order recently issued by the department calling for the inspection of all vessels coming from United States ports north of New York, is being enforced as far as possible. A large majority of vessels from ports north of New York calling at this station are small sailing vessels, principally fishing crafts from Gloucester, and they do not, as a rule, take a pilot on board on entering the harbour, and neither do they display a quarantine signal. Most of them do not even carry a yellow flag, and often their arrival is not signalled at the station. Never, if they come in after dark. So that in spite of all we can do some of them get up to the wharfs before we know they are in the harbour. This is especially apt to happen when they come in at night.

The signalling of vessels entering the harbour during the year just closed has been every thing but satisfactory. Often the citadel could not tell us whether a vessel was local or foreign, and at night they often mistake a tug boat for a large steamer. We are seriously handicapped in our work by the indifference of the signal station.

I believe that the quarantine service of the port could be attended to more efficiently if all inspections were made in the day time—mail boats excepted.

I have the honour to be, sir,
Your obedient servant,

N. E. MacKAY, M.D., M.R.C.S.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 4.

(H. Rindress, M.D.)

North Sydney, October 31, 1901.

Sir,—I have the honour to submit my report for the year ended October 31, 1901. The total number of ships inspected for the quarantine year number 119, of which 81 were steamboats and 38 sailing vessels ; 53 were cis-Atlantic and 66 trans-Atlantic.

Since receiving your instructions in reference to the inspecting of ships coming from ports north of New York, hitherto exempt from quarantine regulations, I may say, that the only difficulty encountered was due to the masters' ignorance of the new regulations, in consequence of which, they did not fly the yellow flag in entering port. I am, however, satisfied, by comparison of my reports with the customs' entries, that none of such ships escaped inspection.

Although small-pox has been so generally prevalent, I am pleased to say that no contagious or infectious disease was found on any ships entering this port.

A case has, however, developed in Sydney, the subject having come there, by rail, from St. Hyacinthe, Quebec. The disease manifested itself five days after his arrival. Since then another case has developed by contagion from the first. By your permis-

sion these cases have been removed to the quarantine station here and are being treated by the Sydney authorities at the city's expense. Both of these cases, I am informed by the doctors in attendance, are very mild. The first is already convalescent. Every precaution is being taken to prevent the spread of the contagion.

The hospital buildings and caretaker's house have received some much needed repairs in the way of shingling and painting. The work of plumbing and sewerage, proposed by the department, is very much needed.

The boat service has been very satisfactory.

I have the honour to be, sir, your obedient servant,

HORACE RINDRESS, M.D.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 5.

(J. E. March, M.D.)

Quarantine, St. John, N.B., October 31, 1901.

Sir,—I have the honour to submit my report for the year ended October 31, 1901.

During this period I have inspected two hundred and seventy-four vessels with crews aggregating five thousand one hundred and eleven, and carrying one thonsand one hundred and ninety-eight passengers.

None of the graver quarantinable diseases were discovered on any of the vessels inspected.

As a precaution against the introduction of small-pox through this station five hundred and sixty persons were vaccinated, sixty baths were given, five hundred and fifty-nine articles of wearing apparel were submitted to steam disinfection, and several hundred miscellaneous articles were disinfected by exposure to the germicidal action of sulphur dioxide and watery vapour, or to formaldehyde gas.

As a precaution against plague, in addition to carefully carrying out the instructions which have been sent me, I disinfected one vessel (*Umberto I.*) to destroy all rats and vermin.

On January 19 I disinfected staterooms on the ss. *Lake Superior*, which had been occupied by a case of scarlet fever landed at Halifax ten days before.

On October 1 it was announced that a case of small-pox had been removed to the General Public Hospital from the schooner *Myra B.* On the authority of a telegram from the Director General of Public Health, I placed this vessel in quarantine. She had been in port ten days when the case occurred, and was loaded, cleared for Boston—whence she had come and was ready to sail. My efforts to prevent the spread of this disease among her crew were successful, and she was discharged from quarantine all well on October 22.

Since the withdrawal of your order exempting from inspection vessels from New York and ports to the north of it, and the receipt of instructions to inspect these vessels with a special view to the detection of small-pox on board of them, I have sought to give every sailor in this coasting fleet, passing through my hands, the protection

against small-pox afforded by a successful vaccination ; and, in order to systematize and facilitate this work, I have resorted to the use of the coloured tickets with which you have supplied me. I have found that a brief explanation of the purpose of these tickets overcomes nearly all objections to vaccination. Special stress being laid upon the value of the scarlet ticket as a time-saver on arrival, captains of coasters, when signing a crew here, give preference to the men holding them. The men are therefore anxious to obtain them, willingly submit to vaccination and are prompt in having their pink tickets exchanged for scarlet ones as soon as the vaccination 'takes.' In order to prevent fraud, I date and initial each card issued and write the holder's name plainly across the back. The scheme is of particular value in dealing with coasters because men once employed in this fleet usually remain in it for years, and in the course of a season about ninety per cent of them would pass repeatedly under the observation of the quarantine officer. The same plan would work fairly well with the crews of transatlantic lines, but in the case of foreign sailing ships or tramp steamers which are seen but once in the course of a season it would be of little use.

An attempt was made during the year to secure an artesian water supply for this station. It unfortunately failed, however, owing to the entrance of sea water, and the boring was abandoned at a depth of six hundred and nine feet. The officers of the Department of Public Works are now considering a proposition to establish a system of surface drainage and filtration which has been submitted by Mr. Cowan, one of their engineers.

The heating apparatus for the new buildings which has been purchased and delivered here has not yet been set up.

The business of the port during the coming winter promises to be the largest in its history. Seven lines of trans-Atlantic steamships will make St. John their western terminus.

Two of them, the Allan and the Elder Dempster lines, are large carriers of steerage passengers. In the not improbable event of having to land three or four hundred immigrants here the wharf accommodation will be found to be altogether inadequate. I hope that during the coming year this difficulty, as well as the difficulty in regard to the supply of water, will be satisfactorily removed.

I have the honour to be, sir, your obedient servant.

J. E. MARCH, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 6.

(J. Macdonald, M.D.)

Chatham, N.B., October 31, 1901.

Sir,—I have the honour to submit my report for the year ended October 31, 1901.

No disease of a contagious character was found on any of the vessels that arrived at the station during the past year.

Ninety-two vessels were inspected since November 1, 1900. In addition to those inspected ten or twelve steamboats arrived that had touched at other ports in Canada and were not, in consequence, subject to quarantine regulations here.

Vessels inspected here arrived from the following countries, viz. : The United Kingdom, the United States, South Africa, Germany, Denmark, Italy, Sicily, Norway, Spain, France, Bermuda, Buenos Ayres and French Guiana.

Through your kindness in representing to the Department of Public Works the necessity for an adequate supply of good water for the quarantine station at Middle Island, the said department very kindly and promptly ordered a well to be bored and a good supply of excellent water was procured at a depth of 84 feet.

The hospital buildings are in good order. Mr. J. Currie, the efficient caretaker, has recently done considerable work in improving the ground around the hospital.

I have the honour to be, sir, your obedient servant,

J. MACDONALD,
Quarantine Officer.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 7.

(P. Conroy, M.D.)

Charlottetown, P.E.I., October 31, 1901.

Sir,—I have the honour to submit my report respecting quarantine at this station during the year ended October 31, 1901.

The chief trade to this port during the past year has been from points north of New York.

There were ten arrivals from across the sea, all of which were carefully inspected and found free from infection.

Following recent instructions the inspection of all vessels from foreign ports has been strictly attended to.

I have the honour to be, sir, your obedient servant,

P. CONROY, M.D.,
Inspecting Physician.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 8.

REPORT ON WILLIAM HEAD QUARANTINE STATION.

(A. T. Watt, M.D.)

Victoria, B.C., October 31, 1901.

Sir,—I have the honour to submit this my report for the year ending October 31, 1901.

The number of vessels inspected has been greater than in any previous twelve months, but there was no occasion for detaining any vessel in quarantine. The number of vessels passed was 448. This is a greater number than was reported as inspected during the previous year at any other quarantine station in Canada, and is an indication of the growing importance of the William Head station.

Bubonic plague has continued to threaten the ports on this coast. During the spring and early summer the disease became epidemic in Hong Kong and other points in southern China. Cases were discovered on two steamers which had cleared from Hong Kong for Victoria. The R.M.S. *Empress of China* had two cases of plague developed amongst her steerage passengers. One sick Chinaman was landed in Shanghai and afterwards died of plague, and on arrival of the vessel at Nagasaki another case was discovered and landed at quarantine, where he afterwards died. The steamer was placed in quarantine at that station for ten days, where the energetic measures taken by the Japanese quarantine authorities and the ship's surgeon successfully prevented further development of the disease; so that it was possible to grant free pratique to the vessel on arrival here. For the next two months, while plague remained epidemic in Hong Kong, the Canadian Pacific Railway Company's steamers carried no Chinese steerage passengers. On the Nippon Yusen Kaisha ss. *Hiroshima Maru*, a case of plague was found in the person of one of the crew, between Hong Kong and Kelung, Formosa. The steamer was quarantined at the latter place, and afterwards proceeded to Japan, and was ready to leave for Victoria when the discovery was made that the rats on board the steamer were infected with plague bacilli. This steamer had sailed originally from Bombay, and there was more than a probability that the infected rats came on board at that port, and that the infection of the member of the crew was from this source, and not from exposure in Hong Kong. The discovery of the disease amongst the rats was made only in time to prevent the steamer leaving for Victoria. The following quotation from one of the Victoria papers sets forth some of the facts in this case : 'According to advices received by the *Empress*, the trouble which occasioned the *Hiroshima Maru* being placed in quarantine just as she was about to start for Victoria, was owing to the discovery of supposed pest bacilli in the blood of rats caught on board the liner. The steamship *Hiroshima Maru* arrived at Yokohama on the 3rd instant (August), but as no traces of pest could be discovered, despite the discovery of a pest patient while on the voyage from Hong Kong to Kelung, she was allowed to anchor at the pier ready to leave for Victoria and Seattle. Subsequently it happened that the blood taken from the rats and kept in the Yokohama harbour quarantine office for the purpose of study, was discovered to contain pest bacilli, which greatly surprised the quaran-

tine officials. But as the *Hiroshima Maru* had already been admitted into the harbour, and as moreover the N. Y. K. Co. would be subject to serious inconvenience if the vessel were detained, a further examination was conducted, and the discovery of bacilli was confirmed, and all doubt dispelled. The discovery was reported to the Nippon Yusen Kaisha, and the steamer was sent to quarantine for ten days.' The voyage was afterwards cancelled. The danger from rats as carriers of plague is well shown by this instance.

A case of plague was removed from the U. S. transport *Kintuck* in Japan. The patient was a Chinese fireman brought from Hong Kong by the Pacific Mail Steamship Company's steamer *China*, and one of a crew of forty-seven to be transferred to the ss. *Kintuck*. The ss. *China* continued on her voyage to San Francisco, and arrived with all well on board. The passengers were, however, landed at the quarantine, and the ship disinfected. The *Kintuck* was put in quarantine at Nagasaki. No other case developed, and the vessel was allowed to clear for Port Townsend.

While possibly the case on the *Hiroshima Maru*, and in all probability the cases occurring on the other above-mentioned steamers, were the result of exposure to the disease on shore, infected rats undoubtedly were the cause of the outbreak of plague on the ss. *Carlisle City*, which arrived at San Diego from Hong Kong the latter part of June, having had six deaths from plague on board, the last day before reaching port. All were in good health on this vessel until twenty-one days out from Hong Kong, when a Chinaman died from what was thought to be opium poisoning ; nine days later, and thirty days from Hong-Kong, the first undoubted death from plague happened. Considering the subsequent case, the death on the twenty-first day may be regarded as suspicious, but the length of time out from Hong-Kong was too long for incubation to have continued after exposure in that port. The outbreak must, therefore, be ascribed to the rats which were observed to be dying before any sickness occurred amongst the crew or passengers. Dr. W. W. McKay, quarantine officer at San Diego, states in his published report that it is his belief that the plague infection on board the ss. *Carlisle City* was due to rats. After showing the improbability of other modes of infection, he states that dead rats were noticed before the outbreak of the first case ; that they were also found in places and conditions, after the ship reached quarantine, showing that death had occurred several days before, in one instance a dead rat being found in a bag of rice, decomposition having advanced so far as to plainly indicate the occurrence of death several days before the ship reached port. The significant fact is further made manifest that a number of rats got on board the vessel in Hong-Kong, as Dr. McKay was informed by the officers of the steamship that in loading this steamer from the lighters (Sampans), that 'not infrequently rats were carried aboard in packages.'

Steamers loading at Hong Kong and at other ports in China and Japan do not go alongside the wharf, but are loaded from the numerous sampans ; the danger, therefore, of rats coming on board directly from the wharf as at other ports is absent. However, there remains the possibility that they get on board concealed in packages, as was evidently the way on the ss. *Carlisle City*, and it is with the object of bringing out this fact that I have referred particularly to the occurrence of the plague cases on that steamer.

I have noticed myself that boxes and baskets of bulbs and roots shipped from China and Japan are frequently gnawed into by rats. In some cases, this may have been done before they were shipped, although most of it is done, no doubt, by the ship rats. In either case, there is danger. In the former, the goods may be contaminated by infected rats, or such rats might remain in the packages either dead or alive ; in the latter case, the ship rats might become infected, as the soil in which the articles are packed or which remain sticking to such products as yams, &c., must be looked upon as dangerous and liable to convey plague to the rats.

By your orders, all Chinese and Japanese foodstuffs, bulbs, tubers, &c., subject to soil contamination, have been disinfected before being allowed a landing, unless such products have been accompanied by a certificate that they were from a part of the country in which there had been no plague. The precautions with regard to such products, which, in consequence of their edible nature, are certain to afford harbour to rats, might as a proper measure of safety be made more stringent before the to-be-looked-for recrudescence of plague occurs in Hong Kong next spring. The disinfection of all products liable to soil contamination might be insisted on before such are shipped, and all other boxes of foodstuffs should be given careful inspection for the purpose of ascertaining that no rats have gnawed into the boxes. In fact, if certain of these products were required to be shipped in earthenware jars or tin-lined cases, as is already, to a certain extent, done, it might not be too severe a requirement, considering the possible danger of the present way of shipping.

Cases of plague have continued to occur in San Francisco. During the last twelve months there have been thirty-one known cases. No rats have so far been discovered to be infected with the plague bacilli, and to this fact may be attributed perhaps the little headway the disease seems to be making in Chinatown. There is no doubt that many conditions are against the spread of the disease in San Francisco, as compared with the conditions prevailing in the unsanitary cities of China, but a severe outbreak is quite within the province of possibility. The nature of the disease in San Francisco is now no longer disputed. A commission of eminent bacteriologists, appointed by the United States government, spent some weeks studying the disease, and settled the fact beyond all doubt, that it was true plague. Since then all the authorities concerned have been working in harmony, and making a strong endeavour to stamp out the disease.

In Honolulu there was a slight recrudescence of the disease during the summer, but only half a dozen cases were reported. Some rats were found from which the plague bacillus was isolated. Cases of the disease have continued to appear in Australia, more particularly in Brisbane. Besides numerous epidemic foci in China, the disease has been present to a slight extent in the Philippines and Japan. From all the places mentioned, regular communication by steam and sailing vesels is had with British Columbia. These vessels have been carefully inspected, and where deemed necessary, baggage and effects of steerage passengers and Asiatic crew have been disinfected, and the people bathed ; 4,178 steerage passengers were bathed, and 3,568 persons belonging to crew. This is less than one-third the number so treated in the previous year, but since the 9th of February, none of the steamers belonging to the N. Y. K. or N. P. companies have been disinfected at this station. Since that date the disinfection carried out before the passengers embark in Hong Kong or Japan has, by your authority, been accepted in lieu of the formerly-required disinfection at this station. This work has been under the supervision of the United States sanitary officers, and is being carried out at the expense of the steamship companies. Another fact which accounts for the smaller number treated, is that the Japanese immigration has practically ceased, owing to restrictions imposed by the Japanese government. And, too, the flow of Chinese immigration was stopped for some time, as the Canadian Pacific Railway steamers refused to carry Chinese after the *Empress of China* was quarantined in Japan on account of plague.

In connection with the plague, an incident that happened in Japan deserves mention. This was the discovery of plague bacilli in the blood of rats caught for experimental purposes in buildings belonging to the Imperial University at Tokio. It was, therefore, unwittingly found that some one had been careless in the laboratory of the university, and great excitement was caused. A bounty was at once put upon rats and war waged against them. But no others were found infected, and no cases of plague developed among the inhabitants of the city.

The continued presence of small-pox in the near-by states and Alaska has necessitated the continuance of medical inspection of all arrivals at the ports and on the boundary line of British Columbia. The province has been remarkably free from the disease, considering the number of cases there have been in adjacent states.

At the commencement of the quarantine year, the passengers and crew of the ss. *City of Seattle*, to the number of 350, were undergoing detention at the station on account of small-pox discovered on examination of the vessel by Dr. Mackechnie, at Vancouver, on her arrival from Alaska. Five cases in all developed in quarantine, the last case being discharged from the hospital in January. The buildings at the station were rather taxed to accommodate the large number of European passengers on this vessel. There would have been ample room if part of the hospital building could have been used. Had a small cottage been available for the few small-pox patients, the large hospital building might have been used for the accommodation of suspects. Such a cottage hospital has been provided for in this year's estimates. When this is built ample accommodation should be had for all classes of passengers in seasons of ordinary travel. Other buildings and improvements at the station provided for, and which should soon be in course of construction, are : laboratory building, house for assistant medical officer, house for the engineer of the quarantine steamer, and some small buildings for different purposes, and a covered passage way on the wharf leading to the disinfecting building. A second disinfecting chamber is to be constructed, and a new boiler house made. Work in connection with the latter is now being done. An electric light plant—a much-needed improvement—is also to be installed.

The steamer *Earl* received a new boiler during July. The old one gave out entirely, going in such a way that further repairs could not be made, so that the boat was laid up for several months waiting for the new boiler to be built. A large naphtha launch was hired for a boarding boat, although the services of a steamer had to be at times secured. The launch was finally bought, as an agreement had been made that if the government elected to purchase, any money paid as hire should go on the purchase price. The launch was so long in use that it was in great part paid for in this way. It has proved a decided acquisition to the station, and is very convenient and serviceable. The man employed as night watchman is able to run the launch, so that it is not necessary to depend on any of the crew of the *Earl* for the purpose.

An approach was made from the shore to the middle of the large wharf for the purpose more particularly of bracing the wharf, as it sometimes gets hard knocks from the large steamers. Last spring the *Empress of China* crashed into the wharf, doing damage to the extent of $2,000 ; the repairs were made at the expense of the Canadian Pacific Railway Company. The upper third of the pipe line supplying water for the station was renewed with four-inch cast-iron pipe ; the old pipe had pitted and was leaking badly. The saloon detention building was painted inside and out, and the inside of the hospital building was painted throughout, cracks in the plaster filled, and the walls painted, so that the inside now presents a very satisfactory appearance. More painting is to be done this winter.

Some vessels which arrived during the year require special mention. The British ss. *Caithness*, from Morovan, Japan, was passed at this station on April 17, going to Comox for coal, and thence to Port Townsend. On arrival at the latter place, the quarantine officer found seven of the crew coming down with small-pox. It was afterwards ascertained that one of the crew had, on leaving Japan, a very mild attack of the disease, so slight, in fact, that no heed was given to it by the man himself, the captain or any one on board. It was from exposure to this case that the cases developed after leaving here. No history of any sickness was given in the captain's sworn declaration made on arrival, and as the crew mustered on deck all appeared in perfect health, and no sign of any recent illness was to be discerned. The man

who had been sick had recovered, as was afterwards learned from the officer at Port Townsend, without leaving any pit or marks on the body, so that failure to recognize anything wrong when vessel was here will be understood. H. M. S. *Condor*, 106 men, arrived April 28, from Panama, having landed ten cases of yellow fever there a month previously. Another case broke out the day after leaving, but was convalescent in two weeks. The vessel was thoroughly disinfected throughout, and the crew bathed and their effects disinfected, the officers and men expediting the work in every way they were able. She was then given pratique. The Norwegian ss. *Horda*, from San Francisco, was held twenty-four hours for clear diagnosis of a case of fever found on board. This proved to be la grippe. The R. M. S. *Empress of China* arrived here July 3, ten days after being discharged from quarantine at Nagasaki, where she had been held on account of two cases of plague having occurred among her steerage passengers on the way up the China coast. Fortunately, all were well on arrival at this station, but special preparations had been made to receive the vessel in case further sickness had shown itself. The quarantine staff were all given preventive inoculations with the Haffkein prophylactic.

It might be mentioned that the Nippon Yusen Kaisha have doubled their fleet of vessels saling here. A steamer of this line now arrives every two weeks. The Canadian-Australian line has larger steamers on the run than formerly. Other companies trading to these ports are already building or preparing to build more and larger vessels.

Dr. W. H. K. Anderson was appointed as assistant medical officer and bacteriologist at the William Heal station in December last. His services as assistant at the station have been of great value, and as an expert bacteriologist, services he might at any time be called upon to render would be indispensable, and should plague come to this station, by his work in the laboratory positive diagnosis of the cases could be made. That assurance and the help he has given me in routine work have sensibly relieved the somewhat heavy responsibilities of the work here previously. Charles H. Higgins, who was here temporarily as bacteriologist, was recalled to Montreal in December.

Besides the cases of small-pox from the ss. *City of Seattle*, one of the passengers had to be taken care of in the hospital for a number of weeks, as he had a severe attack of inflammatory rheumatism, and could not be moved. Other cases of sickness were also in hospital from this steamer, but were well enough to leave with the other passengers when the quarantine period expired. No further cases were in the hospital until the middle of October, when two Chinese steerage passengers were removed from the *Empress of Japan* because of the exhibition of high fever on arrival at this station. As the men had just been taken sick, and it was impossible to be positive as to the diagnosis of their ailment, they were held to make certain it was nothing infectious. They both proved to have bad cases of pneumonia, and one of them died on the sixth day.

I have the honour to be, sir,
Your obedient servant,

A. T. WATT, M.D.,
Supt. B. C. Quarantine.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 9.

(W. H. K. Anderson, B.A., M.B.)

Victoria, B.C., October 31, 1901.

Sir,—I have the honour to submit the following report of the bacteriological laboratory work at William Head for the year ending October 31, 1901.

On your order, I left Ottawa on December 11, 1900, to take up the work of the laboratory at this station in succession to Dr. Chas. Higgins, who had returned to his work at Outremont, Que. I arrived at William Head on December 20, and took charge of the laboratory. I immediately put it into working order, and prepared a supply of media to be ready for any case arriving which might require a bacteriological diagnosis. In the early part of the year no such case presented itself.

To familiarize myself with the appearnce and cultural peculiarities of the bacillus pestis bubonicæ, I obtained from Hong-Kong two culture tubes inoculated from the bubo of a case of plague. I also investigated a tube culture of the germ left in the laboratory. Both these germs having been found to have lost virulence, either from age or the antagonistic action of pus germs present, I wrote to the Director General of Public Health, and through him received from the Marine Hospital Service, San Francisco, two viable cultures of the plague bacillus. These I have since been investigating by the usual methods—inoculation of guinea pigs, cultures and subcultures in broth and on agar and gelatine.

In the latter part of June I inoculated with Haffkein's Prophylactic all the residents and employees of the station in anticipation of the arrival of the R. M. S. *Empress of China*, which was at that time held in quarantine at Nagasaki on account of plague having been found on board. The day following, I re-inoculated all who had not shown a good reaction to the first injection.

This month I made a bacteriological examination of two cases showing high fever on board the R. M. S. *Empress of Japan*, and confirmed the diagnosis in each case of lobar pneumonia.

Besides the work done with the plague bacillus, on two occasions I have examined specimens obtained from the lepers on Darcy Island, and have with some difficulty demonstrated the presence of the bacillus lepræ.

I have been at some difficulty and inconvenience in my work in the present temporary laboratory, but all such objections will be overcome in the new laboratory for which appropriation was made at the last session of parliament.

I have the honour to be, sir,
Your obedient servant,

HAROLD ANDERSON, *B.A., M.B.*

The Honourable
The Minister of Agriculture,
Ottawa.

No. 10.

(R. L. Fraser, M.D.)

Victoria, B.C., October 31, 1901.

Sir,—I have the honour to submit my report for the year just ended.

My duties consist in inspecting all vessels arriving at this port from Puget Sound or Alaska.

The number of ships examined was 1,161.

No case of contagious or quarantinable disease arrived here during the year.

My inspection has been directed chiefly to preventing the introduction of small-pox, which has been very prevalent in the neighbouring states during the year.

I have the honour to be, sir,
Your obedient servant,

R. L. FRASER, M.D.,
Quarantine Officer.

The Honourable
The Minister of Agriculture.
Ottawa.

No. 11.

(L. N. MacKechnie, M.D.)

Vancouver, B.C., October 31, 1901.

Sir,—I have the honour to submit the following report, for the quarantine year ending October 31, 1901, of work done at the port of Vancouver.

There have been 471 vessels inspected. One case of measles in a child arrived on the steamer *Mainlander* in August. No other case of infectious or contagious disease has been found on any vessel examined.

Since May 31, from 50 to some 200 tons of Chinese foodstuffs, &c., arriving on each steamer of the Canadian Pacific Railway Company from plague-infected districts has been disinfected by me.

I have the honour to be, sir,
Your obedient servant,

L. N. MacKECHNIE, M.D.,
Quarantine Officer.

To the Honourable
The Minister of Agriculture,
Ottawa.

No. 12.

(A. C. Smith, M.D.)

Tracadie, N.B., October 31, 1901.

Sir,—I have the honour to submit my annual report on the Tracadie Lazaretto for the past twelve months.

Registered on the books of the institution to-day are eighteen patients. Of these, fourteen are of French, one of English and three of Icelandic origin. Classifying these patients, we may represent the numbers in the first stage of leprosy to be five ; in the second, twelve ; and in the third, one. Their ages vary from 10 to 62 years.

There were four deaths during the year. Two new cases, aged respectively 10 and 11 years, were admitted from a neighbouring district. As showing the necessity for prompt segregation of leprous persons, I may state that the non-leprous father and mother of these children lived in the same house with a leprous woman for two years. They had a family of several children, two of whom became affected, and were brought to the hospital, where they recently died. At the time of their admission segregation was not attended to as promptly as it is at the present day, and there is no doubt that these two recently-admitted children of the same family had become infected at a very early age through contact with the two who have since died.

Hereditary transmission plays a very unimportant part in the spread of leprosy, except as it may engender a predisposition to it. The disease has so long a period of incubation that persons residing in leprous districts become fearless, and have to be reminded of its danger. I am constantly on the watch for new cases, but have not now as much difficulty as in former years, when the people of leprous districts doggedly refused to assist in the searching out of suspected cases. Segregation is now comparatively easy ; and its good effects in this province are shown in the present decrease, as contrasted with the former increase of the disease.

The prolonged exemption of a community in which the seeds of leprosy have been implanted does not guarantee a permanent immunity from it. In France, leprosy had been practically unknown for a long period. But within recent years it has become so prevalent as to convince the public authorities that urgent measures are imperative to prevent its further spread.

There was not the usual amount of serious intercurrent illness among our patients during the year ; and I have to report that all seem contented and seldom otherwise than cheerful. The general behaviour has been good.

Our lepers are not mentally obtuse ; they evince a keen interest in the passing events of the outer world. Some of them occasionally assist in the work about the grounds. Those in the advanced stages have their sores bandaged daily. All are furnished with comfortable clothing and an abundance of nourishing food.

Some of the patients were induced to make use of chalmoogra oil, taken internally in conjunction with creolin, used externally, and in the case of those who persevered in its use, with beneficial results. The general health improved ; ulcers on the limbs healed rapidly ; tubercles disappeared, and swollen faces and hands became reduced to a nearly normal condition. In the case of those who used the remedies

only intermittingly, but little improvement was noticeable. The results of a more extended use of the drug will appear in my next report.

I have again to report the giving of certificates to several persons falsely reported leprous, thus enabling them to return to employment.

I have the honour to be, sir,
Your obedient servant,

A. C. SMITH, M.D.,
Inspecting Physician and Physician to the Tracadie Lazaretto.

To the Honourable
The Minister of Agriculture,
Ottawa.

No. 13.

REPORT OF THE PUBLIC WORKS HEALTH INSPECTOR.

(Chas. A. L. Fisher, J.P.)

October 31, 1901.

Sir,—I have the honour to submit herewith my annual report as Public Works Health Inspector to October 31, 1901.

In the Act 62-63 Vic., chap. 30, intituled 'An Act for the preservation of health on Public Works,' clause 1 thereof reads, 'The expression,' 'public work' or 'work' in this Act, means and includes in addition to every public work of Canada, every railway, canal, bridge, telegraph and other work within the legislative authority of the parliament of Canada.

Wishing to have the above clause of the Act more clearly defined in the interest of the public, and for the carrying out of the regulations thereunder, I wrote the Deputy Minister of Justice on March 28, 1901, requesting his written opinion as to the work or works covered by clause 1, of the said Public Works (Health) Act, 1899, and especially regarding its aplication to railway companies.

On April 3 following, I received his reply, containing the following opinion, and quoting authorities therefor, viz. :—

'All works within the legislative authority of the parliament of Canada are covered by section 1 of the Public Work (Health) Act, 1899.

'What kind of works are within the jurisdiction of parliament may be ascertained by reference to the British North America Act, sections 91 and 92.

'Any works coming within any of the classes of subjects as to which the parliament of Canada has exclusive jurisdiction, under section 91, would be within the section, and also any work belonging to a class which is excepted from the exclusive legislative authority of the provincial legislatures, by paragraph 10 of section 92 of the British North America Act.

'So far as railways are concerned, they do not become subject to the legislative authority of parliament within the meaning of section 1 of the Public Works (Health) Act, merely because they have been subsidized by parliament.

'Whether they are or are not within such legislative authority, depends upon such rules as are applicable to other classes of works.

'In this connection, I may refer you, in addition to the provisions of the British North America Act, above referred to, to the Railway Act, 51 Vic., chap. 29, sections 3 to 7, inclusive, and section 306.

'By the latter section, you will observe that the Intercolonial Railway, Grand Trunk Railway, North Shore Railway, Northern Railway, Hamilton and North-Western Railway, Canada Southern Railway, Great Western Railway, Credit Valley Railway, Ontario and Quebec Railway, and the Canadian Pacific Railway, are declared to be works for the general advantage of Canada, as is also each and every branch line of railway connecting with or crossing the said lines of railway or any of them.

'All these railways, therefore, and their branches and lines connecting with or crossing them, are by virtue of sub-paragraph (*c*), of paragraph 10, of section 92, of the British North America Act, within the legislative authority of parliament, and are, therefore, subject to the provisions of the Public Works (Health) Act.

'There are also almost every session of parliament, many railways and other works declared to be for the general advantage of Canada, and these as well as works which come with subparagraphs (*a*) and (*b*), of sub-paragraph 10, are within the legislative authority of parliament.'

Finding therefore that the regulations made by Order in Council of January 31, 1900 (under the said Act), for the preservation of health and the mitigation of disease among persons employed in the construction of public works, was somewhat inoperative, they on the 13th day of May, 1901, were by Order in Council, rescinded, and new regulations passed and established in lieu thereof.

As soon thereafter as a sufficient number of the Public Work (Health) Act, 1899, and the regulations thereunder, could be printed, I mailed copies of the same to contractors, managers or others in charge of all public works, railways, mining or other public companies throughout the Dominion, with the following circular letter :—

'Department of Agriculture,
'Ottawa,
'Public Health Office,

'F. Montizambert, M.D., F.R.C.S.,
'Director General.

'Charles L. Fisher,
'Inspector,
'Ottawa.

Sir,—By direction of the Honourable the Minister of Agriculture, I inclose you herewith a copy of the Public Works (Health) Act, 1899, also a copy of the regulations under said Act, as passed by the Order in Council of May 13, 1901.

'I would especially draw your attention to clauses 2 and 3 of said regulations and await your reply thereto, also to such other of the said clauses as may apply to any such work under your charge and request that you see to the carrying out of the same without delay.

'In fulfilment of my duties under said Act and regulations I will, if thought advisable, visit any such works at an early date, to inspect the same and see if the said regulations are being complied with.

'I am, sir,
'Your obedient servant,

'Chas. A. L. Fisher,
'*Inspector.*'

After receipt of numerous replies to the above letter, I started out on a tour of inspection of the various enterprises coming under the application of the above named Act, of which I had been notified that work was in progress, but in order not to complicate the various works, and to simplify matters for those who may read this report, I will divide the public works coming under the application of the said (Health) Act, into three classes, viz. : 1st, canals, 2nd, railways, 3rd, mines and works of other public companies.

CANALS.

In the various works of the kind being carried on by the Dominion government, I found that the sanitary condition of employees was being fairly well looked after by contractors, or others in charge, but there seemed to have been no regular medical supervision, until after the receipt (by said contractors or others in charge) of the new regulations in force, under the Public Works (Health) Act, 1899.

The works at Farran's Point, under the charge of the Canadian Construction Company as contractors, I found to be well advanced towards completion, and but few men employed, but they were well located, sanitary conditions good, and had hospital accommodation within a reasonable distance.

At the Rapide Plat Canal works, the employees were being well looked after by the contractors, Weddell, McAntiff & Co., and had good hospital accommodation at Morrisburg, close by.

At the Galops Rapids Canal at Iroquois, under contract to Messrs. Larkin & Sangster, I found the work almost completed and few men employed, they being house in the surrounding villages, and having medical men within call at all times, and hospital accommodation within a reasonable distance either east or west of them. The works there have apparently been carried on under strict sanitary conditions, and both the government and contractors may feel proud of the work as constructed.

The works on the same canal at Cardinal, under contract to Messrs. Wm. Davis & Sons, are not in such an advanced state, and a large number of men are employed, many of them being comfortably housed with the surrounding residents, and all having the supervision of the medical men of the village. The permanent hospital used when necessary, is at Prescott, a few miles west, but the contractors have the necessary tents, &c., for use in an emergency. There were a few cases of fever there last spring, and a threatened outbreak was apprehended, but owing to the prompt measures taken, there was no spread of the disease, and it was quickly wiped out.

The upper works on the same canal, about three miles west of Cardinal, under contract to S. E. Cleveland, or Cleveland Brothers, are well advanced, but as there is yet a great deal to be done, a large number of men are employed.

The contractors there have taken every sanitary precaution, and made many improvements in the interest of their employees, seldom carried out to such an extent on public works.

The location of the works being entirely isolated from any town or village, the contractors have secured a considerable extent of land, and built substantial, comfortable and decorative detached houses for each of their married employees, of whom there are quite a number. These houses are each surrounded by flower beds or garden plots, are wired for electric lighting, have water closets and baths, and are supplied with water by pipes, and electricity for lighting, both from works erected specially for that purpose.

The single men are well housed and cared for in two large boarding-houses, erected by the contractors, and granted to suitable parties, who have to board and lodge the men at a stipulated figure per week. The contractors retain the supervision of those houses, and see that the best food is supplied, and the sanitary arrangements are well looked after ; they supply water and electric light, but have no interest in the purchase of supplies therefor, or profits therefrom, but guarantee the board of their men, who must settle weekly. Croquet and other lawns have been laid out in the grounds, and provision made for the healthful amusement of the men, their wives and families.

Such care has been taken in a sanitary way, that not even a pailful of stagnant water could be found in the location of the works or surroundings.

The health of the men and their families is and always has been good, and no threatened outbreak of disease has ever occurred.

No special medical man is employed to superintend the employees of the works, but arrangements have been made so that a telephone call will quickly bring the attendance of a qualified M.D.

If a permanent hospital were found necessary, the one at Prescott, a few miles west, would be used, but the contractors are supplied with tents or other requirements in case of an emergency.

The men employed on these works, with the exception of some old foremen, are all Canadians, the contractors believing that two Canadians are equal to three foreigners such as are generally employed on such works.

The work done on this contract will, I think, compare favourably with anything of its kind, and if I were on the outlook for a sanitarium in which to spend the summer, I doubt if I could select a more healthy or pleasant resort.

At the Trent Canal works, section No. 1, at Peterborough, under contract to Messrs. Covey & Lavierdiere, the work was nearly completed, and few men employed, so that it was not necessary for the contractors to fulfil the requirements of the regulations under the Public Works (Health) Act, 1899.

There had not, during the progress of the work, been any outbreak of disease, and if there had been, good hospital accommodation is provided at Peterborough.

At section No. 2, Balsam Lake division of Trent Canal, and the near-by village of Kirkfield, there was, last spring, a sudden and simultaneous outbreak of small-pox. On receipt of the information by telegram, I immediately visited the village and canal camp, and found that such efficient work had been done by the local health officer, Dr. J. F. Ross, of Kirkfield, in quarantining the canal camp, and the various houses in the village where those attacked were confined, and also the houses they had lately visited, that there was not much likelihood of the disease spreading. On my visit to the canal works camp, I gave a copy of the regulations under the Public Works (Health) Act, 1899, and instructions thereon, to Mr. Sangster, a member of the firm of Larkin & Sangster, the contractors for said section, and who was quarantined in the camp. He was well pleased thereat, and immediately set about to fulfil the requirements of said regulations, and on the recommendation of the said contractors in writing being sent to me, John McKay, M.D., of Woodville, Ont., was appointed medical officer for said section, as provided by the said regulations.

On making inquiry and investigation as to the cause of the simultaneous outbreak of the disease, I found that it was caused by the presence (at a social gathering of twenty-one young people), of a shanty man recently returned from the Sudbury district, and that the only one of the party who did not contract the disease, was one who had lately been vaccinated, and that I consider as a pretty good proof of the efficacy of vaccination.

In a report just received from the Medical Officer, Dr. McKay, he says :—

'In reference to the sanitary condition of section 2, Balsam Lake, division of Trent Canal, I beg leave to report that it is most satisfactory. There has not been a single case of typhoid fever, diphtheria, scarlet fever or measles on the works from its commencement. In regard to the small-pox, the outbreak was mild and all recovered perfectly. The most rigid precautions were taken by the municipal authorities, and also by the contractors, Messrs. Larkin & Sangster, and the disease was apparently stamped out, as there has not been a case since last May. There has not been a death among the workmen so far, and nothing more serious than ordinary bronchitis has so far prevailed. About a third of the men employed are Italians, none of them had small-pox, and they have all been very healthy, with the exception of cases of indigestion, no doubt due to improper diet. Those Italians are fairly clean in their habits, bathing once a week, as a rule, and drinking nothing stronger than lager beer. They are industrious and frugal, and all appear to be very anxious to learn English.'

At No. 3 section of the Balsam Lake division of the Trent Canal works, near Gamebridge, Ont., under contract to Messrs. Brown & Aylmer, the regulations under the Public Works (Health) Act, 1899, are being carried out as far as found necessary, and thereunder, on the recommendation of the contractors in writing, A. Grant, M.D., of Beaverton, Ont., has been appointed medical officer.

In a late report to me he says : 'In regard to No. 3, Trent Canal, I may say that the boarding houses in connection with the works, are in a fairly sanitary condition, and that there has been no infectious diseases. Some of the men in July went home with symptoms of typhoid, but they boarded in farm houses.'

RAILWAYS.

In regard to public works of this class, I have to say that my circular letter sent out with copies of the Health Act, and regulations thereunder, has been fairly well replied to, and that I have been notified of various new works in progress or in contemplation, but some of these are not of sufficient magnitude to come under the application of the regulations provided by the Public Works (Health) Act, 1899.

QUEBEC AND LAKE ST. JOHN RAILWAY.

This company were constructing at St. Gabriel, seventeen miles from Quebec, a deviation of the main line, necessitating the building of about four miles of new road, including a bridge over the Jacques Cartier river. The force of men employed, was about 175, principally residents in the vicinity, and the number of men camped at the works, did not exceed forty.Sanitary regulations were well looked after, and every necessary hospital accommodation was well provided at Quebec. With the exception of the bridge, the work is now likely completed.

CHATEAUGUAY AND NORTHERN RAILWAY.

I was notified in June last that the above company intended to construct the present year, a line of railway between Montreal and Joliette, a distance of thirty-seven miles, but on inspection lately, I found that the work had not yet been commenced.

THE ALGOMA CENTRAL AND HUDSON BAY RAILWAY COMPANY.

The main line of this railway is completed to the Gonlais river, a distance of thirty miles from Sault Ste. Marie.

From the Gonlais river for seventy miles, Farquier Bros. have the contract, and had about 1,000 men employed.

Between Farquier Bros. contract and the Michipicoten division, Messrs. Comnece & Bowman have the contract, and had about 700 men employed.

MICHIPICOTEN DIVISION.

This branch, extending from Michipicoten to Helen Mine, twelve miles, has been completed.

JOSEPHINE BRANCH.

From Josephine Junction, on the Michipicotin branch, nine and a half miles has been completed.

MANITOULIN AND NORTH SHORE RAILWAY.

Between Sudbury and the Gertrude Nickel Mine, a distance of thirteen and a half miles has been completed.

Between the Gertrude Nickel Mine and Vermillion river, five miles, about 300 men were employed.

From a point on the Canadian Pacific Railway, near Stanley station, southerly to the Whitefish river, on Lake Huron, sixteen and one-half miles, the contract was about to be let, when some 1,200 extra men would be employed.

The last two named railways, are being constructed by the Clergue Syndicate, with headquarters at Sault Ste. Marie, Ontario, and the regulations under the Public Works (Health) Act, 1899, are being fully carried out, but as I give a more detailed report upon that subject, *re* said syndicate, under the class 'Mines and other Public Works,' I beg to refer you thereto.

CANADIAN NORTHERN RAILWAY.

This company is comprised of the Winnipeg Great Northern, Manitoba South-Eastern, and Ontario and Rainy River Railways. Then, there is the Port Arthur, Duluth and Western Railway, from Port Arthur to Gunflint Lake on Minnesota boundary, about eighty-five miles. A very large body of men have been employed on construction work on the above lines, which are now controlled and operated by Messrs. Mackenzie & Mann.

The regulations under the Public Works (Health) Act, 1899, have been well carried out thereon, a number of copies thereof having been supplied at the request of the secretary of the Canadian Northern Company for distribution to the various contractors. Tents and other necessaries were provided, and permanent hospital accommodation at hand at several near points.

There were a few cases of small-pox last spring at Beaver Mills, a station on one of the above lines, and where an international bridge is being built under contract to Messrs. Mackenzie & Mann, but the disease did not obtain much headway, and was soon stamped out.

CANADIAN PACIFIC RAILWAY.

This company are constructing, under a charter to the Kootenay and Arrow-head Railway Company, a line from Lardo, at the head of Kootenay Lake, to Selkirk, at the foot of Trout Lake, British Columbia, a distance of thirty-five miles, exclusive of sidings, ways, spurs, &c.

Owing to a strike among various employees in British Columbia, progress has been slow, and the line has not been completed, but when that has been accomplished, it will give necessary access to what promises to be one of the richest mining districts of the country.

Several hundred men were employed on the above work, and health regulations were being well attended to, and there had been no disease among the employees. Temporary hospital accommodation was provided in case of an emergency, and a good, permanent one could be easily reached within a reasonable distance.

I understand the above company, in any further works requiring it, will be pleased to carry out very thoroughly the requirements of the regulations under the Public Works (Health) Act, 1899.

MINES AND WORKS OF OTHER PUBLIC COMPANIES.

Consolidated Lake Superior Company.

This company is, perhaps, better known as 'The Clergue Syndicate,' with head-quarters at Sault Ste. Marie, Ont.

I have previously referred to some of the ventures of this syndicate, under the class 'Railways,' but owing to the very large number of men they now employ, and

which they are likely to soon greatly increase, the magnitude of their undertakings and the great advantages the Dominion of Canada is likely to receive therefrom, I think it advisable to mention the various enterprises and public works they own or control, are now operating or constructing, and are putting in operation, at an outlay of millions of dollars, and as fast as the necessary men therefor can be secured, viz. :

The Algoma Central Railway and Steamship Company.
The Manitoulin and North Shore Railway Company.
The Algoma Commercial Company.
The British American Express Company.
The Algoma Central Telegraph Lines.
The Lake Superior Power Company.
The Tagona Water and Light Company.
The Michigan Lake Superior Power Company.
The Algoma Steel Company.
The Sault Ste. Marie Pulp and Paper Company.
The Algoma Iron Works Company.
Chemical Works.
Large lumber camps, and nickel, copper and iron mines.

The Helen iron mine, owned by the above syndicate, is situated at Michipicoten, and is among the leading iron mines of the world, owing to the enormous mountain of ore, and its richness of quality. Foley Bros., four Canadians, have the contract for taking out the ore, and employ about 400 men.

A few miles to the north is the Josephine iron mine of this company, to which a branch line of railway has just been constructed.

To show how thoroughly the regulations under the Public Works (Health) Act, 1899, are carried out by the above-named syndicate, I beg to say that the following fundamental rules are the basis on which the sanitary conditions of all their camps are regulated, and so heartily, as a general rule, do the employees of the various companies seem to assist in the carrying of them out, that I am pleased to be able to say that their camps compare most favourably with any in the land.

The site of all camps is selected with the object of convenience, but also in regard to the watershed of the section, so that the water supply of the camp may come from above any possible contamination from the drainage from the camp or elsewhere. All kitchen refuse and waste must be regularly burnt, and thus destroyed. Closets and washrooms are placed in convenient places, and strict regulations govern their use, no nuisances being tolerated. Cleanliness is encouraged in every way. Sleeping camps are thoroughly aired and flushed out each day. Spitting on the floors of camps is strictly prohibited, receptacles for same being placed in convenient places and regularly cleaned.

All camps are open to inspection by the company's surgeon, and the sanitary conditions are subject to the order of the allied companies' board of health, consisting of the following officers :—

Mr. C. R. Loring, Superintending Sault Ste. Marie Pulp and Paper Company.

Mr. H. Durer, Master Mechanic, Algoma Iron Works Company.

Mr. T. J. Kennedy, General Superintendent, Algoma Central and Hudson's Bay Railway Company.

With the company's surgeon, Dr. J. R. McLean, as health officer and sanitary inspector.

The medical conveniences for the employees of the companies, consist in a staff of eight physicians.

The employees proper of the railway company, numbering about five hundred men, are under the care of the companies' surgeon at Sault Ste. Marie and Michipicoten Harbour.

The General Hospital at Saut Ste. Marie, Ontario, gives them the facility of as good nursing and hospital attendance as can be secured anywhere, and has in the past, done most valuable work in this respect.

The contractors along the line of construction, have in all, some two thousand men, with a staff of five physicians located along the line of work, who cover the ground daily, weather permitting.

Any case of severe injury or illness that can safely be moved, is brought at once to the hospital at Sault Ste. Marie, where arrangements are made for their care.

There is also situated at the Helen Mine, a most complete hospital, where patients from the upper end of the construction line are attended.

Midway between, at Agawa, the company have another good sized hospital in charge of a physician.

All along the line, there are tents, &c., for any emergency case of an infectious nature, and all due care and precaution is taken to avoid any serious outbreak of any such disease.

ALBERTA RAILWAY AND COAL COMPANY.

The coal mines of this company are situated at Lethbridge, N.W.T., and are under the management of Mr. P. L. Naismith.

A large number of miners are employed, and health regulations are strictly enforced, the miners willingly complying with the demands of the company in that respect, and no serious disease has occurred among them.

One of the best equipped hospitals to be found anywhere, is maintained by the company, and is situated within fifteen minutes walk of the mines.

HALL MINES AND SMELTER.

These are situated at Nelson, British Columbia, and employ a large number of men.

Health regulations are fairly well carried out, medical supervision is provided, and good hospital accommodation is obtained in the town.

PAYNE MINING COMPANY.

The mines of this company are situated in the Slocan district, near Sandon, B.C. A considerable number of miners are employed, who are well paid, well housed, and well fed ; the health regulations are excellent, and a miners' hospital is maintained in the town of Sandon.

THE SLOCAN STAR MINES.

These mines are also near Sandon, B.C., and when in full operation, employ several hundred miners.

The sanitary regulations fulfil requirements, and the miners' hospital at Sandon is at their service.

NEW VANCOUVER COAL MINING AND LAND COMPANY, LIMITED.

The coal mines of this company are situated at Nanaimo, B.C. About 1,200 men are employed, the company having the largest pay-roll on the Pacific coast.

Health regulations under Dominion Act, 1899, are well carried out, the employees paying $1 per month for medical supervision, and attendance on themselves and families.

Splendid hospital accommodation is provided in the town, and only a short distance from the mines.

WELLINGTON COLLIERY COMPANY, LIMITED.

The coal mines of this company are situated at Extension, B.C., about eight miles from Nanaimo. About 1,000 men are employed, who are assessed for medical supervision and attendance, and health regulations are enforced. The hospital at Nanaimo is used when necessary.

I have much pleasure in calling your attention to the excellent health and condition of all classes of employees on public works coming under the application of the Public Works (Health) Act, 1899, and to say that from conversation with many of them, they are well pleased at the passing of the said Health Act, and the enforcing of the regulations thereunder, also that contractors, railway managers, and those in charge of other public works, are taking an interest in the carrying out of said regulations, seeing the advantages gained therefrom, and as an instance thereof, I quote below a clause of a letter addressed to me in my official capacity, from one of the largest employers of labour in the Dominion, George B. Reeve, Esq., second Vice-President and General Manager of the Grand Trunk Railway Company of Canada, viz. :—

'You will find that we are willing to give every facility for the examination of our works, as we are fully imbued with the importance of perfect health, not only with reference to the public generally ,but also in connection with all departments of our railway. It is the healthiest men that do the best work.'

I have the honour to be, sir,
Your obedient servant,

CHAS. A. L. FISHER,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

CATTLE QUARANTINE.

No. 14.

REPORT OF THE CATTLE QUARANTINES IN CANADA

From November 1, 1900, to October 31, 1901.

(By Professor Duncan McEachran, F.R.C.V.S., V.S. Edin., D.V.S. McGill, Chief Inspector of Live Stock for Canada.)

Office of the Chief Inspector of Stock,
Montreal, October 31, 1901.

Sir,—I beg herewith to transmit my twenty-fifth annual report of the Dominion Cattle Quarantines and to append hereto the reports of the Pathologist and Assistant Pathologist.

It is my pleasant duty to again call your attention to the general healthfulness of all classes of live stock throughout the Dominion. Hog cholera reappeared in a few of the old centres, but was effectively and immediately dealt with by your inspectors, and is at present not known to exist in the Dominion. Sheep-scab also reappeared in the counties of Peel, Victoria and Ontario, but was at once eradicated. Actinomycosis has greatly decreased. Pictou Cattle Disease still continues to lurk in old centres, but it also is decreasing. Tuberculosis is still decreasing, notwithstanding the determined opposition which certain importers raised to the only reliable diagnostic agent known, tuberculin. The decrease in the number of animals tested is due to testing having been stopped during spring and summer months as explained at page 82, of this report.

I beg specially to call your attention to my report of 'The British Congress on Tuberculosis for the prevention of Consumption,' which I attended as one of your representatives.

Outbreaks of glanders, especially in Manitoba and the Territories, owing to the importation of cheap horses from the south, still continue. With a view to furnishing information as to its nature and symptoms, a bulletin has been prepared which will be freely distributed among horse breeders throughout the country. Anthrax and symptomatic anthrax seem to be becoming more frequent in occurrence; a bulletin dealing with these diseases has also been prepared for distribution among all classes of the agricultural population. These diseases have been successfully arrested by the use of Pasteur's vaccines. Malarial fever in horses has caused considerable mortality among horses in the district of Northern Alberta, and a peculiar outbreak of abscess on the poll and withers has been reported from the Cariboo district. Both require investigation to elucidate the true nature and cause.

I have the honour to be, sir,
Your obedient servant,

DUNCAN McEACHRAN.
Chief Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

EXPORTATION OF LIVE STOCK FROM MARITIME PORTS.

TABLE showing numbers shipped during five years as reported by veterinary inspectors.

The numbers here given are not intended for statistical purposes, being merely records of inspections, see minister's own report for correct numbers as furnished by the Customs Department.

——	Cattle.	Sheep.	Horses.	Swine.
1897	117,428	62,406	10,651	....
1898	111,948	47,050	7,057	....
1899	97,014	62,308	4,980	174
1900	103,511	7,734	3,597	63
1901	94,385	1,583	63,843	70

TABLE showing number shipped from each port.

——	Cattle.	Horses.	Sheep.	Swine.
Montreal to Great Britain	80,533	1,160	46,575	....
Quebec to Great Britain	817	....	....	....
St. John, N.B., to Great Britain	11,835	227	13,619	....
" to Newfoundland	626	52	2,045	25
Charlottetown to Great Britain	....	....	200	....
Charlottetown to Bermuda and West Indies	9	49	30	27
Charlottetown to United States	....	1	....	....
Halifax to Great Britain	259	....	....	....
Halifax to Newfoundland	18	3	....	....
Halifax to United States	1	1	....	....
Halifax to Bermuda and West Indies	23	79	1,098	9
Summerside to Newfoundland	264	4	180	....
Summerside to United States	....	7	6	7
Georgetown, P.E.I., to United States	....	....	....	2
Total	94,385	1,583	63,843	70

Of these there were 11,718 cattle and 23,702 sheep from the United States.

HORSES shipped by Col. Dent to South Africa as Army Remounts.

(Table kindly furnished by him.)

——	Horses.
From the provinces of Ontario and Quebec	5,147
" " New Brunswick and Nova Scotia	115
" North-west Territories	786
Total	6,048

The army horses were not subjected to inspection by your inspectors as were commercial shipments.

The above tables refer only to animals inspected by veterinary inspectors under quarantine regulations. Several thousands of Canadian cattle were shipped via the United States ports of Portland and Boston.

As will be seen by inspectors' reports, the health of all classes of stock continues exceptionally good, only 79 cattle, 72 sheep and 45 horses were detained at the shipping ports, most of which were subsequently sent forward.

ANIMALS rejected during the year at the port of Montreal.

——	Cattle.	Sheep.	Horses.
For actinomycosis	2		
" injuries	74	49	
" strangles			21
" influenza			23
" mange	1		
Total	77	49	44

ANIMALS rejected at port of St. John, N.B.

——	Cattle.	Sheep.	Horses.
For pneumonia			1
" foul in foot	1	1	
" acute bronchitis	1		
" injuries		22	
Total	2	23	1

It is pleasing to note that breeders in all parts of the Dominion are improving their herds by using pure bred bulls the effect of which especially in the Territories and Manitoba is very marked in the quality of the herds. Large numbers of pedigreed bulls have been placed on the ranges, and the old scrub range bull has almost entirely disappeared. The bulls most in demand are Shorthorns and Galloways; the latter have proved highly satisfactory, being found prolific and hardy.

I have much pleasure in reporting that the duties of inspection were satisfactorily performed at the shipping ports by M. C. Baker, D.V.S., C. McEachran, D.V.S., and B. A. Sugden, D.V.S., at Montreal ; by J. A. Couture, D.V.S., at Quebec ; by William Jakeman, D.V.S., at Halifax, N.S. ; by J. H. Frink, V.S., at St. John, N.B. ; at Charlottetown, P.E.I., by A. E. Leckie, M.R.C.V.S., and at Summerside, P.E.I., by W. H. Pethick. V.S.

EXPORTATION FROM MANITOBA AND THE NORTH-WEST TERRITORIES.

In compliance with a request, I have been furnished by the general freight traffic manager of the Canadian Pacific Railway with the following statement of cattle, sheep, horses and swine carried by them from Manitoba and the Territories to Montreal for shipment, for twelve months, ending October 31, 1901 :—

Cattle, 31,456 ; Horses, 1,057.

It will be observed that this is a marked decrease in the number of cattle exported from the west. This is attributed by some to the wet late summer, followed by a very bad fly-season, which kept the cattle from fattening. Notwithstanding this the heaviest cattle yet shipped from Alberta were sent to the Klondike among the first shipments this summer. One steer is reported to have been shipped recently which weighed over a ton.

STOCKERS.

A large number of yearling stockers were put on the Alberta grazing ranges during the past summer, nearly 20,000 head—bought mostly in Manitoba and Ontario—and the prospects are that this branch of ranching will increase. Ranchmen should consider well before expending their capital in stockers, especially the essential points, 1st, the provision for winter feeding—unless they have large fenced fields, roomy yards and comfortable sheds or close brush, with at least a ton of hay per head for yearlings, they should not buy this class of stock. 2nd. of equal importance is it to see that they are well-bred and of beef strains, Shorthorn, Hereford, Polled Angus or Galloway crosses by preference. Dairy strains no matter how cheap they appear to be bought will be a disappointment and their presence in a herd depreciates the whole lot. Ranchmen should not receive stockers too early in the season. The farmer and the middleman will want to get them off their hands as soon as the snow disappears, and too often these domestic yearlings, having been warmly housed and indifferently fed, are shipped to the ranches and turned loose, before the grass has started, to perish in large numbers in the early spring snowstorms, or from eating larkspur or other poisonous plants which come up before the grasses.

The first of June is early enough to have them arrive. They should be in good healthy and strong condition before being put on cars to enable them to stand the fatigue of a long journey. They should be frequently fed en route ; we have known of heavy losses owing to too long fasts. They will winter better and pay in the end better if they are at least twelve months old before being sent to the ranges. It is every one's duty to do his best to keep up the reputation of Canadian steers which hitherto has been high ; to do this we must have them well bred. It is seldom a well bred steer is cut back at shipping time.

IMPORTATIONS—MARITIME CATTLE QUARANTINES.

——	Cattle.	Horses.	Sheep.	Swine.
Lévis Quarantine, Quebec	390		1,108	63
St. John, N.B., from Great Britain	13	6		
" " United States	1			11
Halifax, N.S.	1	8		
" from South Africa		3		
Charlottetown, P.E.I.			1	
Total	405	17	1,109	74

Of these 141 cattle, 727 sheep and 5 swine were for the United States.

Seven calves were born in quarantine, two of which died. Twelve cattle were tested with tuberculin, without reaction.

It is satisfactory to note that no disease of a contagious nature was found to exist among any of the imported stock. I have pleasure in reporting that the duties of inspection at the quarantines were satisfactorily performed by J. A. Couture, D.V.S., Point Lévis ; William Jakeman, D.V.S., Halifax, N.S.; J. H. Frink, V.S., St. John, N.B.; and by A. A. Leckie, M.R.C.V.S., Charlottetown, P.E.I.

IMPORTATION FROM THE UNITED STATES AT FOLLOWING PORTS.

——	Horses.	Cattle.	Sheep.	Swine.	Mules.
St. John, N.B		1		11	
Niagara, Ontario		4	3	13	
*Point Edward, Ontario		18		7	
Windsor, Ontario		10	1	1	
Emerson, Manitoba	704	900	114	89	4
Gretna, Manitoba	246	169	103	39	2
North Portal, Assiniboia	2,984	2,942	57	391	101
Maple Creek, Assiniboia	555	103	8,560		
Coutts, Alta	1,492	3,993	11,486	9	12
Cardston, Alta			41,565		
Nelson, B.C	271	95	7,614		4
Grand Forks, B.C	193	45	487	43	1
Victoria, B.C	212	37	319	1	4

*There also passed through this port 18 head of cattle and 255 sheep, returning from Fat Stock Exhibition at Chicago.

HORSE RAISING IN CANADA.

The introduction of electric and other motors some years ago led to the idea being widely entertained that we had entered on a 'horseless age,' and that henceforth horse-breeding would become a thing of the past—and to a certain extent the bicycle craze, the motor carriage, but more especially the application of electricity to motor power, in some measure justified this scare, for such it proved to be.

During the past five years horse-breeding as a special effort has been almost entirely given up—not only on the farms of the older settled districts of Canada, but on the stock ranges of the western prairies. Already as a result of this, and owing to the exportation of a few thousands annually, there is a dearth of good horses, which are largely in demand, and readily bring good prices when found. I am safe in saying that good horses will bring to-day double what they would have been sold for three or four years ago, and in many instances a much greater increase in value has been experienced. It is encouraging to observe that many of our most energetic, far-seeing agriculturists are turning their attention to horse-breeding, both in the east and in the west, and such experienced business men know what they are about, and will follow the proper lines in what they do. There are many who breed horses in Canada to whom a few practical suggestions may prove useful, and to them the following hints are addressed.

When you breed, breed to suit your market, and breed what will command the highest price in that market.

Buyers will search for what will fill their orders, whether it be a race horse, a trotter, a park hack, a lady's horse, a hunter, a roadster, a carriage or harness horse of

any description, including draught horses, light or heavy, and will pay the highest price for the best horse. Aside from the cost of the mare and service of the stallion, the expenses incurred in raising a horse to five years old is the same whether he is a good one or a bad one, a high-priced one, or a dear-at-any-price one ; therefore, when you breed, breed the best.

BREEDING STOCK.

No one disputes the advantages of pure-blood ; 'blood will tell' is a truism well understood by horse men. In using a sire, whatever breed you decide on, see to it that there is no flaw in his pedigree. 'The sire is half the herd,' is another saying of great practical meaning, well understood among breeders. Where expedient, the mare should be, if not pure bred, at least a cross of the same breed as the stallion, violent crossing—such as a thoroughbred mare being served by a Clyde stallion—should on no consideration be practised. Let the farmer mate his mare with a stallion most likely to produce a saleable type, if circumstances necessitate crossing.

POINTS COMMON TO ALL GOOD HORSES.

The following points in conformation should be found in stallions and brood mares : They should be vigorous, active specimens of their breed, of full size (undersized animals should not be selected for breeding, the tendency is to become smaller) ; therefore, select full-sized breeding stock, but avoid overgrown ones. The colour should be dark. Light, faded colours indicate weakness of constitution, and are undesirable to breed from.

CONFORMATION.

The head should be of medium size of the breed ; it should be pleasing to the eye, the forehead wide, the eyes large and prominent ; it should be well set on to the neck, with a clean-cut out throat. The neck long and the crest full rather than the reverse ('Ewe neck'), the withers high, the back short, the quarters wide, with well-muscled hips and thighs, tail straight and well set on, orifices small and firm, the ribs rounded and deep, the chest deep, the girth large, the muscles of the chest and shoulder well developed. The width of the chest should vary with the breed, but it should not be narrow in any breed. The legs should be symmetrical ; crooked hocks, bent knees, light bone, small or contracted feet, should be avoided. The feet vary with the breed, but in every breed they should be proportionate to the size of the animal, should neither be too wide nor too narrow ; the horn should be of good texture and capable of resisting friction when barefooted, and of securely retaining a shoe when shod. Action is all important and counts a good deal in the value of any kind of horse ; in front it should be bold and free, with prompt lifting of the foot from the ground ; flexing the knee freely (knee action) and putting the foot down fearlessly. Behind, the prompt free lift of the foot, the free flexion of the hock (hock action) and the fearless swing of the foot and limb forward should be looked for in the sire and dam.

SIRES AND DAMS WHICH SHOULD NOT BE BRED FROM.

Blind stallions or mares, subjects of what is known as Specific Ophthalmia, a disease notoriously hereditary ; subjects of navicular disease, ringbone, spavin or broken wind ; having small 'crow eyes,' narrow foreheads, short necks, long backs,

narrow hips or chests, long legs, light bone, bad tempers. Mares which are poor milkers will not pay to breed from, as the foal is usually stunted from want of milk.

The observance of these few hints in selecting sire and dam may prevent much vexatious disappointment in the result of breeding horses.

The future market of Canadian horses is now assured ; let us breed the best only, and obtain the highest market price and a ready sale for our stock because of its superior quality.

GLANDERS.

It is gratifying to be able to report that glanders may be said not to exist at the present time so far as is known to the department in any of the older provinces ; during the past year only two cases were reported in Ontario—none in Quebec or the maritime provinces. It is occasionally seen in British Columbia, 3 horses having been shot on this account at Nelson. It continues to prevail to some extent in the North-west Territories and in Manitoba, thus :—

SHOT FOR GLANDERS.

	Manitoba.	North-west Territories.
1897-98	97	96
1898-99	..	118
1899-1900	80	91
1900-1901	75	90

There is no doubt that this is a very serious matter, and constitutes a serious menace to the horse breeding industry in the west. For several years in my annual report I have pointed out that the source of infection was the States to the south of the Territories—whence cheap ponies were frequently imported and sold to settlers and ranchmen. The most careful inspector may fail to discover the disease in its early stages. I beg to call your attention to what Commissioner Perry says in his report on this subject : 'There is one subject that demands attention and that is the 'importation of a worthless class of horses by half-breeds and Indians. They go 'south of the line and acquire a certain number of ponies which they smuggle into 'the Territories. Apart from these being an undesirable class of animal, they are not 'inspected by any veterinary surgeon and as a consequence glanders or other infec-'tious or contagious diseases can be introduced.'

During the Klondike boom large numbers of such worthless ponies were brought into the Territories, and much disease was thus spread among range horses; large numbers also found their way into Manitoba, and still continue to be imported there, —hence the prevalence of glanders in that province, notwithstanding the active efforts of the provincial government to stamp it out. During the past summer, this subject has received special attention at the hands of the Mounted Police and the officers of your department but the inspection of semi-wild ponies in bands on the open prairie is sourrounded by so many difficulties that inspection cannot be relied upon except when the animals show clinical symptoms. Corrals have been ordered to be built at North Portal and arrangements are required to be made at other points to provide conveniences for thorough inspection and mallein testing when necessary.

I would also suggest that the importation of cheap and dangerous horses be discouraged by imposing a minimum valuation for customs duty of $50 per head and the prohibiting the entry of the entire band in which glanders is found to exist, all found diseased to be killed without compensation.

The great increase in numbers and values of horses in the west in the near future, requires that some such measure be adopted for the prevention of this plague.

If horse-breeding is to get the encouragement to which it is entitled, and if we would develop and retain our export markets we must extirpate this disease, and prevent it from being brought into the country.

The following bulletin on glanders will be distributed freely throughout the country for the purpose of informing breeders of its nature, symptoms and means of diagnosis. We hope it will be carefully read and its suggestions acted upon.

GLANDERS IN HORSES.

Now that the suitability of Canada for horse-raising has been demonstrated, and the excellence of Canadian horses has been proved by the severest tests, this country henceforth will be looked to as a field for purchasing of horses by all the European countries, both for civil and military purposes.

The enormous advances in values within the past three years, owing to increased demand and scarcity of good horses elsewhere, should induce our farmers and ranchmen to recommence horse breeding without loss of time so that we may retain the demand for our produce and increase our output.

Unfortunately in a few instances horses purchased by Imperial officers for remounts were found to be affected by glanders, a contagious disease which is known to exist to a limited extent especially in the western portion of the Dominion, Manitoba and the Territories, due very largely to the importation from the south of cheap ponies which are constantly being brought into the country and sold to farmers throughout the west.

This bulletin has been written with the object of informing those interested of the nature of the disease, means of recognizing it and what each should do to prevent its introduction and arrest its extension; and the Minister of Agriculture hopes that the efforts being made by the official veterinarians and mounted police officers will be seconded by every horse breeder and agriculturist in Canada, as it requires the combined efforts of all concerned to accomplish the desired end.

GLANDERS AND FARCY.

Glanders and farcy are one and the same disease, both are due to a specific virus. They may occur independently or may co-exist, and may be acute or chronic.

The horse, ass and mule are most susceptible. It has also been produced in the dog, lion, goat, sheep, pig, cat, guinea pig and pigeon by inoculation. It is readily communicated to man by inoculation; and grooms with sores on their hands frequently contract the disease from horses which they may be attending. It is due to a rod-shaped straight or slightly curved bacillus with round ends, called the *bacillus mallei,* which is ærobic, that is, requires oxygen of the air to live and thrive. It is found in the discharges from the nose, in pus of ulcers, in farcy buds, in tubercles when found in the lungs, in diseased glands, and less frequently in the blood when the disease assumes the acute form.

SYMPTOMS AND DIAGNOSIS.

Occasionally the symptoms in chronic cases are obscure. In acute cases they are pronounced, consisting of rigors, fever, swelling of the glands in the submaxillary region, often farcy buds along the course of the lymphatics of the hind legs or shoulders; a leaden colour of the mucous membrane of the nostrils, and in later stages, patches of congestion, erosions and ulcers which have depressed mouse-eaten-like centres, raised edges surrounded by a red areola and discharging a sanious pus. The localization of the lesions (chancres and tubercles) occur in the membrane lining the nostrils and

upper air passages, in the larynx and lungs. In true glanders, the submaxillary glands are enlarged, hard and attached to the sides of the jaw. The lesions are frequently confined to one nostril—the discharge from which is constant, though seldom excessive, but always adhesive, often of heavy specific gravity sinking in water, and in advanced stages it is offensive and mixed with blood indicating the exposure of blood vessels by the ulceration and the implication of the cartilage or bones.

In the lungs numerous small tubercle-like nodules are found resembling milliary tubercles of tuberculosis, which when present produce quickened breathing and cough. In the superficial form usually called farcy, the localization is confined to the chains of lymphatic glands in the groin and shoulder which swell, suppurate, and form open ulcers which discharge a similarly adhesive pus.

It may commence as glanders, farcy setting in subsequently or vice versa. The former is incurable, although some authorities claim to have witnessed recoveries. Farcy is supposed to be curable by some, but the one so often runs into the other, and the risks of error so great that we prefer to deal with both forms as incurable.

In a country of such vast extent and variety of climate as Canada, we find corresponding variations in most diseases of animals, and in glanders particularly is this the case. It is a disease especially of the cheap horse, thus in the crowded cities there are many poor men who work cheap horses and stable them in buildings unfit for animal habitation. These are the horses which becoming infected spread and perpetuate this disease by infecting buildings, drinking troughs, &c. In them, too, we meet with it in its most virulent and acute forms.

On the farms, too, infection is spread by the congregation of horses in crowded stables on market days and during church service. In farm horses which are a great deal in open air and sunshine it usually assumes a somewhat chronic form; acute cases being less frequently seen than in cities.

As seen in the prairie country and Rocky Mountain regions it is not nearly so pronounced in its manifestations, is seldom acute and often very deceptive and difficult to diagnose clinically; hence the greatest care should be exercised by those who bring horses into Manitoba and the Territories to take every precaution against its introduction. It is to be feared that during the past four years this disease has been repeatedly imported from the south by cheap ponies brought in to sell to mining outfits; true, careful inspection is ordered and carried out by the veterinarians of the mounted police, and they do the best they can under the circumstances, yet we know that inspection of large numbers of semi-wild horses on the prairie cannot be other than unsatisfactory, as glanders in a latent form can only be detected by close examination or the mallein test, which is usually impractical, for want of necessary facilities and difficulty in handling them. Unfortunately also many of those who purchase cheap horses for riding and packing purposes have little knowledge of horse flesh and are ignorant of the indications of disease, or the danger to which even one diseased horse may expose those men and horses with which it comes in contact. This ignorance tends to spread this insidious malady.

Fortunate indeed is the fact that the bacillus of this disease readily dies if exposed to sunlight. The bright scorching sun of our territorial regions and the strong winds so often prevailing there, are our surest safeguards against it, as is also the usual practice followed by travellers of turning horses loose on the prairie or on a picket line instead of into a stable or shed, thus preventing to a large extent both direct and stable infection.

MALLEIN AS A TEST.

Mallein, which is a sterilized glycerine extract from cultures of the *bacillus mallei*, the pathogenic bacilli of glanders, is the analogue of tuberculin, and is believed by those who have had most experience of its use as a diagnostic agent to be as reliable in dis-

covering occult cases of glanders when not discernible by symptoms, as is tuberculin in tuberculosis.

Its Injection and Results.—It is injected subcutaneously in the same manner as tuberculin—the normal temperatures being taken during the previous day. If glanders exists, within from six to eight hours there will be a hot painful swelling at the point of injection, and a rise in temperature of two degrees to five degrees or more, and occasionally a rapid development of the general clinical symptoms may follow. In all instances where practicable the test should be applied to every doubtful animal, and to all which have been expressed to infection direct or mediatory.

We recommend every reader of this bulletin to consider well the following:—

FACTS WHICH HORSE OWNERS OUGHT TO KNOW ABOUT GLANDERS.

It is contagious and communicable by direct contact and mediatory agents, such as feed boxes, drinking troughs or pails.

It is communicable to man, when the virus comes in contact with a sore, or into the mucous membrane of the eyes, nose or mouth.

It is incurable in both animals and man.

In man it is a most painful and loathsome disease, with offensive discharges from the throat and nostrils, and unhealthy boils and blebs all over the body.

In buying horses, nasal discharges should always be viewed with suspicion, and horses with such should be refused unless on expert advice.

WHAT EVERY HORSE OWNER OUGHT TO DO.

Immediately on discovering symptoms indicatory or suspicious of glanders, isolate the animal completely, and report his suspicion to the Minister of Agriculture.

On no consideration should a horse owner try to hide such a suspicious animal, he endangers his other horses, the lives of men working with or about the horse, or of members of his family, or it may be his own life.

In the Territories, report to the Commissioner of the North-west Mounted Police, who will order necessary action on behalf of the Minister of Agriculture.

The owner should carry out to the letter all preventive measures suggested by the veterinarian, even at a good deal of trouble and expense. In dealing with infected stables, nothing short of removal and burning of all woodwork, feed boxes, hay boxes or racks, will be effective, the floors and stall divisions may be planed and limewashed, or scrubbed with some disinfectant solution.

The following simple direction for the disinfection of stables extracted from last year's report may be useful in dealing with glanders:—

'When the buildings are modern and properly constructed as to air space, light, drainage and ventilation, disinfection is a simple matter.

'When, however, the stable building is old, perhaps a utilization of some old wooden structure for housing animals, or the make-shift erections of the pioneer in the west who by force of circumstances has been compelled to provide some sort of shelter which because horses are kept in it is called a stable, it is more difficult.

'The disinfectant may be gaseous, spray, liquid or solid. The gases most used for disinfection are chlorine and formaldehyde.

'In using gas for disinfectant purposes it is necessary to remove the animals, and close up tightly the doors, windows and ventilators.

'To generate chlorine gas, place, say, 8 ounces of common salt with which an ounce of black oxide of manganese has been mixed, in an earthenware plate, then pour three ounces of sulphuric acid over the mixture and stir, when chlorine gas will be evolved. Care must be taken not to inhale any of the fumes as they are very irritant to the bron-

chial tubes—several plates may be used according to the size and form of the stable. It should be left closed for four hours when it may be opened and air and light freely admitted for several hours before animals are returned to it.

'Vaporized formaldehyde is extensively used for disinfecting houses, it is disengaged by a special apparatus and is introduced to a room or building by a rubber tube passed through a key-hole.

'Steam is very effective where it can be conveniently furnished.

'The liquids used for disinfection are: solutions of corrosive sublimate which while much used in human practice are too dangerous to be employed for disinfection of stables or byres, solutions of carbolic acid, creolin, sulpho napthol or sanitas, may be used either in watery solutions or in combination with lime wash.

'Reliable disinfection may be obtained by using a spraying pump and applying a lime wash to every five gallons of which a pound of commercial carbolic acid is added, forcing it into every corner, crack or crevice of the walls, stall, divisions and floors.

'The solids used are lime, chloride of lime, and carbolate of lime which are useful for sprinkling floors or mixing with composts and manure heaps.

'More powerful chemicals are prescribed for disinfection, but in selecting the above we have considered efficiency, safety, cheapness and facility in procuring as most country druggists can supply them.'

Insidious and incurable as this disease undoubtedly is, the facility with which the infective properties of the *bacillus mallei* are destroyed by sunlight and dry air as well as by such measures as above suggested, and diagnosis by the mallein test being almost absolutely reliable, it is quite within the possibilities that this disease may be completely eradicated, and if fresh importations are prevented, our horses will have a clean bill of health which will greatly enhance their value and ensure a ready sale.

MALARIAL OR SWAMP FEVER IN HORSES.

In last year's annual report a letter from an extensive horse-breeder at Battleford was published and some explanations given as to the nature and prevention of equine typhoid. During the past summer reports of serious losses of horses of all ages reached the department from the low lying farm lands along the Calgary and Edmonton Railroad, supposed to be from the same disease.

I visited the infected district on the 14th September with a view to discover if possible the cause of the losses, which I found to have been considerable, and that they occur most frequently if not entirely during the fly season, viz.: the months of July, August and September. In nearly all cases the animals pastured on swale land, although some state that the disease has been seen in stabled horses also. The symptoms were, dulness, drooping of the ears, weakness, rapid loss of flesh, in some cases costiveness at the beginning followed by diarrhœa, swelling between the forelegs and along the belly, the pulse weak and soft, excessive thirst towards the termination. They are said to eat well to the end, some were said to have bled at the nose.

In two post mortem examinations which I held, I found the evidences of disease confined to the intestinal tract, the stomach in each was congested and studded by ecchymosis both externally and internally. The petechiæ were abundant along the whole alimentary tract and in one subject I found gangrene of a portion of the large intestines and inflammation of the villous coat of the stomach and mucus membrane of the intestines.

The kidneys were swollen and like the intestine studded by petechiæ. The liver was soft and friable.

A. McGee was said to have lost all his horses, J. Alwyn, thirty or forty ; Mr. Mitchell, fourteen, &c.

The mortality at Olds, Innisfail and other places has been equally severe.

I found, however, that all of the deaths could not be justly attributed to this cause.

One horse which was included in the list had been driven thirty miles over very bad mud roads at a quick pace, took colic, rallied, had a relapse in a few days and died from inflammation of the bowels. Another had been fed on unthreshed barley one day and unthreshed wheat the next, he died from intestinal inflammation. Another, on inquiry, I found died from a broken neck. A Mr. Dick had lost three horses, one was sick from January till April, all died from different causes. However, I found evidence enough of extensive mortality among horses in this section due to some cause which may be difficult to determine.

On making inquiries I found that for at least three seasons the rainfall had been unusual and the sloughs were all full, the slough grass rank, and mosquitoes very numerous.

Recent investigations in connection with malarial fevers, especially yellow fever, have shown that certain varieties of this fly are unquestionably the inoculating agents in these and probably other diseases. When people were housed in mosquito proof houses, made so by being covered by wire netting, they could cohabit with yellow fever patients and not contract the disease ; if, however, they were bitten by this special family of mosquito, Stegomyia Taeniata, which had fed on a yellow fever patient, they became affected with the disease.*

Just how much mosquitos have to do with producing this equine malarial fever, for such it is, has not yet been determined.

I would suggest that an officer of the department be sent during the midsummer months to investigate this disease on this and other lines, so that we can ascertain definitely the cause, and improve our chances of suggesting a preventive.

In the meantime owners of horses will do well as far as practicable to keep them stabled and protected from mosquitoes and other flies, and especially to keep them away from sloughs and swamps, owners of bands of horses cannot do this, but those who can ought to do it even if at considerable inconvenience to themselves.

MANGE IN CATTLE.

I have pleasure in reporting that mange in cattle which two years ago existed extensively throughout the ranching districts of Alberta has now been eradicated in some of the worst infected localities. By the reports of Mr. R. G. Matthews, secretary of the Western Stock Growers' Association, J. H. G. Bray, secretary treasurer Medicine Hat Stock Growers' Association, Inspector J. F. Burnett, N.W.M. Police, Macleod, John C. Hargrave, D.V.S., Dominion inspector at Medicine Hat, D. Coristine, V.S., Maple Creek, and Commisisoner Perry of the North-west Mounted Police, it will be seen that this disease still exists, although to a much less extent than formerly, yet Coristine reports 140 cases in his district, and Hargrave 75 per cent as being affected on the Red Deer river, and that the ranchers, north of the railroad and east of the river treated about thirty gathered on the fall round-up.

It has been demonstrated that this disease can with a little attention on the part of the cattlemen be completely eradicated and it is to be hoped that the experiences which have been gone through will lead them to treat every case occurring among their herds, not only to cure the affected animals but to prevent them infecting others.

'WESTERN STOCK GROWERS' ASSOCIATION, MACLEOD, ALTA.

'DEAR SIR,—Referring to your letter of the 30th ultimo *re* the existence or otherwise of mange on the range now, I beg to state that I have made inquiries in all directions with following results:—

Willow Creek—One case found on Fall Round-up, a few scattered since.

* 'American Medicine' November 23, 1901.

High River—A few cases found, mostly fat dry cows and steers, but nothing like the number found at same time last year.

Maple Creek—A few cases found on Round-up, but more found since and it is expected they will become more numerous as the cold weather increases.

Medicine Hat—Cases found on Round-up, and on several occasions beef cattle were cut back from shipments.

North Fork—No cases found on Round-up and no report received of its existence in that neighbourhood.

Crane Lake—Four cases found on Round-up, all yearling bulls.

Macleod—One case (a cow belonging to the Indian Department) found on Round-up. No cases since.

Porcupine Hills—No cases found.

Cochrane range—No cases.

This practically covers the ranching country, and you can draw your own conclusions from it. Of course the weather so far this year has been extremely favourable to cattle and the disease may crop up again in the spring, but to all intents and purposes it seems to have disappeared. Scattered individual cases are no doubt occurring but they can be attributed to the fact of stock using the brush for shelter and rubbing on infected trees.

Yours truly,

(Signed) R. G. Mathews,
Secretary.'

Medicine Hat Stock Growers' Association,
Stock Inspector's Office,
Medicine Hat, N.W.T.

'Dear Sir,—I beg to acknowledge receipt of your letter of the 30th ult, *re* mange, and in reply would say that from careful inquiries and my own personal observations as stock inspector, my opinion is that mange is still prevalent on the ranges of this district. We have not seen many cases in the stock yards, only a very few having been cut back by Dr. Hargrave, but it was found on the Round-up and exists on some ranches though not to any serious extent, and with proper care I have no doubt it will soon be eradicated.

I remain, dear sir,
Yours respectfully,

(Signed) J. H. G. Bray.'

Medicine Hat.

'Dear sir,—Referring to your inquiry regarding mange I have delayed answering, as I was going out among some of the ranchers and would be able to make a better report.

It still continues to exist among some of the herds, but a great many of the ranchers say that they have seen no sign of it since last winter and some claim that they never had it. On the Red Deer river about 75 per cent are affected and the ranchers north of the railroad and east of the river treated about 30 head gathered on the fall round-up. It would appear that the smaller ranchers who are better able to keep their herds free from it have done so, but that, with one or two exceptions, all the larger stockmen still have it in their herds, but to a less extent than ever before.

(Signed) John C. Hargrave,
Government Veterinary Surgeon.'

In his report, Veterinary Inspector Burnett, N.W. Mounted Police, Macleod, says:—

'Mange, one of the most dreaded diseases of cattle, appears to be fast disappearing from the herds, that occasional cases are seen, I have no doubt, but the fact that the owners have been taking them up for the past two years and treating them at home precludes the possibility of my seeing them, and while I do not think that this method of treatment fully accounts for the gradual disappearance of the disease, it has no doubt not only exerted considerable influence in the eradication of the malady, but has been the means whereby a great many fat cattle have been shipped that otherwise could not have been.'

ACTINOMYCOSIS (*Lumpy Jaw*).

By referring to the inspectors' reports it will be seen that this disease (which is due to the ray fungus), is gradually but surely decreasing. At the shipping ports it is rarely seen now—only two animals were rejected for export on account of it as against nine the previous year and twenty-nine two years ago—and reports from inspectors show equally satisfactory results.

For information as to its nature and treatment see last year's report, page 73.

HOG CHOLERA.

I regret to have to report that hog cholera again broke out in some of the localities in which it had previously existed in the western peninsula of Ontario, traceable in most cases to infection derived from the Indian reserve, Walpole island. With remarkable regularity it was found that the outbreaks followed the course of the river, into which dead hogs had been thrown ; this was noticed also when the previous outbreaks occurred in that district.

NUMBER OF FARMS ON WHICH FRESH CASES HAVE BEEN FOUND.

Western Peninsula of Ontario (Counties of Kent, Essex and Lambton)	90
Toronto district	2
Burford district	6
Ottawa district	1
Total	99

NUMBER OF HOGS SLAUGHTERED.

Twelve months, ending October 31, 1901 :

Hogs slaughtered—Diseased	597
" Contact	701
Total	1,298
Indemnity	$ 6,996 42

It will be seen that only nine farms were quarantined outside of Kent, Essex and Lambton.

I have pleasure in reporting that the disease is again non-existent so far as reports show, and it is to be hoped that those responsible for the Indians will see that the practice of throwing carcasses into the river is prevented in future. All carcasses should be burned as the surest means for destroying infection through them.

It is gratifying to notice from the reports of the inspectors that the decrease of mortality from the disease is 'due to a large extent to the fact that the farmers are becoming better posted as to preventive measures and are more willing to report cases promptly before infection has time to spread' (Perdue's Report).' 'I find that the farmers are more anxious to report disease in their farms and are more thorough in cleansing and disinfecting the premises' (G. W. Orchard's Report). Inspector Jos. Kime, Chatham, reports as follows : 'For eleven months there was not a case of swine plague or hog cholera came under my notice until a butcher introduced it again by store hogs brought to his slaughter-house.'

Clearly the disease can be eradicated and its reintroduction prevented if interested parties would but carry out the means suggested in the bulletins and regulations issued by the department for their benefit.

PICTOU CATTLE DISEASE.

This disease still continues to appear among the dairy cattle of Nova Scotia, confined to the limited area where it has been seen for forty years. Its causation still remains a mystery ; yet it does not extend beyond the infected district. Cattle have been removed from this district to other places without the disease appearing or being introduced into these new districts.

The report this year shows a marked falling off in the number of deaths.

	No. Slaughtered.	Amount Paid.
1899-1900	149	$1,1,51 99
1900-1901	91	723 66
Decrease	58	$ 428 33

INSPECTION OF STOCK YARDS AND CARS.

Mr. Auger, inspector of stock yards and cars, reports improvements in the cleaning of cars.

He travelled as far west as Victoria, B.C., and reports improvements in the stock yards en route, and a disposition on the part of railway officials to meet the requirements of the public in this respect.

Both Mr. Auger and the local veterinary inspector, Mr. Frink, report very highly of the new yards built by the Canadian Pacific Railway at East St. John, N.B., which can accommodate under cover a thousand head of cattle. This improvement was much needed, and will prove not only a boon to cattle shippers, but will be the means of increasing the live stock shipments from St. John.

SHEEP SCAB.

I regret to report that slight outbreaks of sheep scab occurred in the counties of Peel, Victoria and Ontario, in which nineteen farms were quarantined, and the sheep treated by dipping, the premises being thoroughly disinfected. The outbreaks were completely controlled, and so far as is known to the department, no sheep scab exists at this date in any part of the Dominion.

Table showing the number of farms quarantined for Sheep Scab, twelve months ending October 31, 1901.

Number of Farms on which Fresh Outbreaks have been Found :—

Peel County, Ont.	3
Victoria County, Ont.	4
Ontario County, Ont.	12
	19
Number of sheep slaughtered	2
Indemnity	$3 66

The probability of an immediate extension of sheep-breeding in the Territories, and consequently extensive importations from Montana and Dakota is evident from the numbers already brought in ; special instructions were given to inspectors to see that the most thorough inspections were made, corrals for the purpose being furnished by the department at certain points. They were also authorized to detain sheep for a second inspection whenever they considered it necessary ; so far, no scab has been found in any of the importations. Breeders cannot be too careful about the selection of sheep in Montana.

ANTHRAX AND SYMPTOMATIC ANTHRAX.

By reference to the reports of inspectors it will be seen that outbreaks of anthrax and symptomatic anthrax (black leg), are becoming more prevalent—the former is reported to have been dealt with at Millbrooke, Ont., Lunenburg, Ont., Oznabrook, Ont., at New Glasgow, P.Q., Chateau Richer, P.Q., at Maple Creek, Regina, Medicine Hat and Swift Current, in the North-west Territories; and the latter at Clarence Creek, P.Q., Niagara, Ont. and Vancouver, B.C.

The outbreak of anthrax in sheep at Swift Current proved to be a very serious affair, occurring as it did in a flock of about 16,000 sheep belonging to the Canadian Land and Ranche Company. Owing to the difficulty in obtaining a sufficient supply of freshly prepared anthrax vaccine due to this vaccine requiring to be used within a few days of its being prepared and none of the firms who manufacture immunizing lymphs, or vaccines keeping it on hand and the distance requiring about four days for it to reach Swift Current, delays were encountered and unfortunately owing to faulty lymph supplied by one firm, considerable mortality resulted from its use, while the results of using that supplied by the Pasteur Vaccine Company were very satisfactory. About 3,000 died in all, of which 475 died subsequent to vaccination, and one cow and eight horses died from the disease at the same place. The survivors were progressively moved off the infected area, which was close-quarantined and stock of all kinds prevented from entering on it. All carcasses were burned, and instructions were given to burn the grasses before any stock are allowed on to it again. The use of the Pasteur vaccine demonstrated its efficacy to produce immunity. Equal success attended the use of this vaccine in the eastern outbreak; at Oznabrook Dr. Moore vaccinated 273 cattle with most satisfactory results, Mr. Higginson, V.S., Rockland, vaccinated several hundred at Lunenburg with equal results.

Blackleg vaccine has been extensively employed for immunization in all parts of the Dominion, especially in the Territories and British Columbia.

All carcasses of animals dying from this disease are ordered to be burned and every proper precaution taken to prevent recurrences.

A bulletin on anthrax and symtomatic anthrax will shortly be issued and freely circulated throughout the country containing correct information about these diseases. I trust it will be carefully read and the suggestions contained therein put into practice ; it is herewith appended.

ANTHRAX.

This disease, which is much dreaded in European countries on account of the sudden and serious losses which it occasions, has, fortunately, been scarcely known to exist in Canada till the present summer (1901) when several rather serious outbreaks occurred, as will be seen by referring to the reports of the Cattle Quarantine Inspectors published as appendices to the report of the Minister of Agriculture.

This bulletin is published with the object of informing stockmen of the nature of this disease and its cause, of how it is spread among herds, and of the measures necessary for its prevention. A careful study of it will convince the reader that if the disease is left unchecked and preventive precautions are neglected, not only may present serious losses be experienced, but the land itself may be rendered infective for fifty or a hundred years; already certain farms and districts both in the east and in the west are known to be anthrax infected, and the disease breaks out on them at irregular periods, the animals dying with alarming suddenness.

It is well known that the spores of the bacillus in some way get into the ground, and that they may remain there in a dormant state for many years. According to Crookshank: 'By some means or other the spores contaminate the grass, and hay imported from an anthrax infected district may start the disease at a farm on which it had never been known to occur.'

'The skin, hair, wool, hoofs and horns of infected animals, if soiled with blood, are contaminated by the bacillus.' It is an infection which is the very reverse of that of contagious pleuro-pneumonia, which requires the contact of living diseased with living healthy animals, whereas anthrax infection rarely takes place from living animals, unless the blood containing bacilli is allowed to contaminate the food, or inoculate a wounded surface. It is the carcass that is to be dreaded as the source of infection.

ANTHRAX BACILLUS.

The immediate cause of the disease is the entrance into the bodies of healthy animals of rod-shaped bacilli or their spores, either in food or water or by inoculation through an abraded surface or open wound.

The bacilli themselves are easily killed, but their spores resist ordinary germicides and even such degrees of heat as kill all other spores of bacteria.

The effect of the entrance of these virulent spores into an animal body, by whatever channel they enter, is to soon destroy the subject by their rapid indefinite multiplication and their pernicious action on the blood, which they deprive of its life-sustaining properties by absorbing the oxygen and obstructing the minute capillary circulation, death taking place in most cases instantaneously and without noticeable symptons of illness.

Bollinger recognizes three different forms of anthrax as affecting the domestic animals:

1. Apoplectiform, which kills in from a few minutes to several hours.
2. Acute anthrax, lasting from a few hours to a few days.
3. Sub-acute forms of anthrax; all cases of a longer duration.

In the first and second forms the disease runs its course with remarkable rapidity, and animals so affected frequently die as if stricken by lightening, without having given rise to any previous suspicions regarding their condition.

In the third form the mortality exceeds 70 per cent.

The disease seldom affords opportunities for even experimental treatment.

In cattle and sheep the post mortem lesions consist of a black tar-like appearance of the blood which teems with bacilli, ecchymoses in most of the internal organs, especially the small intestines, mediastinum and messentry, with great enlargement of the spleen which is distended with black tar-like blood. This organ is found in this condition in all cases of internal anthrax.

External anthrax is occasionally seen in horses and sheep, rarely in cattle, and is usually due to inoculation by flies. It is attended by local swelling which is hard and painful, and spreads rapidly to the surrounding parts, general infection takes place and the animal usually dies, the post mortem lesions being similar to those of intestinal anthrax.

The manner in which anthrax is spread should be well known. The bacilli require oxygen to sporulate, hence if the carcass is cut open and exposed to the air, spores form readily in the blood, and whatever is smeared with it immediately becomes infective; and ignorance of this fact is accountable for the careless disposal of carcasses of animals which have died from anthrax. It is too frequently the practice of farmers and others to drag a dead animal away from the buildings, perhaps across a pasture or hay field, and leave it unburied or only partially covered in a swamp or wood where it is easily reached by dogs and vermin, by which portions are dragged across fields, smearing the ground or grasses with spores of the bacillus.

PREVENTIVE MEASURES.

On no account should the body of an animal which has died of anthrax be opened or skinned. If the blood is confined within the body, and discharges from the natural openings prevented by plugging them with tow saturated with a 20 per cent solution of carbolic acid, and the carcass carried, not dragged, to the place prepared for burning it, no infection can take place from it. As a precautionary measure, however, the stall and surroundings where the death occurred should be thoroughly disinfected, as well as the cart or wagon which it has been carried in.

By all means burn the carcass—and bury the ashes deeply with lime. Just think of the risks that are run by any carelessness in dealing with a carcass from which millions of millions of infective spores may be given off, and in some way reach the surface years after to infect and destroy cattle, sheep, swine and horses, and enormously reduce the value of the farm. Some authors state that horses are not particularly susceptible, but such is not our experience in Canada, for in nearly every outbreak we have had to deal with, horses have died from it, as well as cattle and sheep.

IMMUNIZATION AGAINST ANTHRAX INFECTION.

The method of vaccination by an attenuated virus as a preventive of anthrax, discovered by Pasteur, has been extensively employed, especially in France and Russia, for many years, and for some years back in the United States and Canada. So long as the vaccine could not be obtained within a few days of being manufactured, its use was found to be impracticable, as it will not keep long under any conditions, and deaths have been produced by using vaccine when too long kept, or where it has been carelessly prepared and tested. Two cultures of different degrees of virulence are used, Vaccine No. 1 kills mice, but not guinea pigs; Vaccine No. 2 kills guinea pigs, but not rabbits.

The sheep, cattle, swine or horses to be inoculated are given by subcutaneous injection a dose of No. 1 Vaccine, and in 12 days thereafter a dose of No. 2.

Protective lymphs are supplied by the manufacturers, the Pasteur Institute, Chicago, and Messrs. Parke, Davis & Co., Walkerville, Ont. Printed directions are given with these.

During the past summer protective inoculation has been extensively employed with satisfactory results in several outbreaks, both in the east and west; fourteen thousand sheep on one ranch having been inoculated by officers of the department.

The vaccination, however, should not be undertaken by any inexperienced person, and on no account should old or doubtful lymph be used.

SYMPTOMATIC ANTHRAX.

Black leg, or black quarter, occurs occasionally in various parts of Canada from ocean to ocean. It is a disease which principally affects young and thriving cattle, and is seen more rarely in sheep and goats. It occurs at irregular intervals in certain districts, especially during the summer months, sometimes extensively, and at other times causing the deaths of only a few fat calves here and there within a limited area; it will prevail for a few months, especially when the calves are thriving best, and then disappear perhaps for some years. It is, like anthrax, a disease the germs of which emanate from the soil, but it is also seen in stabled animals when fed on hay grown on infected land.

It also is a bacterial disease, but although the bacillus is a spore bearer it is not identical with that of anthrax, and can be distinguished by being shorter and having rounded ends; the bacilli do not form chains as do those of anthrax, besides they have flaglellæ having the power of movement, and, being anærobic, cannot be cultivated in an atmosphere containing oxygen. They form spores which are usually seen at the end of the rod, are ovoid in form, and are larger than those of anthrax. The bacilli are not found in the blood during life, but may be found in it after oxygenation ceases when death occurs. As the name indicates, the pathological manifestations are mostly confined to the quarter; which may be the hind or may be the fore, the calf becomes lame and unable to move the limb, except in a dragging manner, the quarter swells and the swelling crackles under the hand as if it contained confined air or gas. The animals may die suddenly or linger from twelve to forty-eight hours. Treatment is useless, and the remarks made as to the disposal of carcasses of animals dying of anthrax apply also to animals dying of black leg.

Setons in the dewlap are empirically recommended, but are of doubtful utility. It is well to check too rapid fattening by moving the calves to poorer pasture, and by giving them exercise by driving, and they should be prevented from eating grass grown over the graves of dead cattle; all graves of dead animals should be fenced.

Vaccination by means of an attenuated virus of the disease is now extensively and successfully practiced throughout Canada, more especially in the stock-raising districts of the west.

Vaccinating outfits can be procured from the Pasteur Vaccine Co., Limited, 56 Fifth Avenue, Chicago, or Messrs. Parke, Davis & Co., Walkerville, Ont., who manufacture the vaccines and furnish full directions for using them.

The vaccines are of two kinds, viz., single vaccine requiring only one application, and double vaccine requiring two application; first and second lymph.

The double vaccine especially has proved highly successful in the immunization of young stock both in the United States and Canada. Another form of vaccination is that should it be found as effective as the lymph injection it will prove a great boon in saving labour to the owners of large herds of range cattle.

Cattle and horses are usually vaccinated on the neck or shoulder; sheep on the inside of the thigh. Vaccination may be done at any time, but the spring is the most favourable, and it is more necessary then as the disease prevails most during early summer.

It should be done at any time should an outbreak be discovered in a herd.

The immunization lasts for about twelve months.

Young bulls brought on to ranches from the east should be vaccinated before being turned out, and in districts where the disease is known to have existed, eastern stockers of a cord saturated in the vaccine, which is inserted but once by means of a needle; should be similarly protected.

TUBERCULOSIS.

Table showing the number of cattle tested for tuberculosis in each province for twelve months, ending October 31, 1901 :

Ontario	6,786	162
Prince Edward Island	100	..
Quebec	2,177	115
New Brunswick	208	3
Nova Scotia	309	14
British Columbia	92	9
Manitoba	464	33
North-west Territories	17	1
	10,153	337

It will be seen that the number tested during the past twelve months is less by 7,632 than the number tested during the preceding twelve months. This is due to testing having been stopped during the summer months, owing to the loss of time and inconvenience experienced by inspectors on account of the cattle being in the fileds, and the owners busy, for which reasons it was decided not to test till October and during the winter months.

By referring to Dr. Moore's report it will be seen that he tested 630 head, 123 of which were tuberculous and 5 suspicious, but he states that 92 of the above diseased animals were from three herds, 57 being out of a herd of 72 dairy cattle, 18 out of a herd of 21, and 17 out of a herd of 20.

If we leave out these three plague-smitten herds, we find that the percentage of reactions is extremely small.

The subject of tuberculosis and tuberculin testing has received much attention, and has been fully discussed in the press and on the platform during the past year ; animated discussions have been carried on in the newspapers and agricultural press, congresses have been held at Ottawa, New York and London to which were invited those supposed to be best informed, the result being the publication of a vast amount of information bearing on this important subject.

It has been stated that tuberculin was a means of spreading tuberculosis by producing it. To prove that this is erroneous, Dr. Higgins was furnished with samples of tuberculin, obtained from Koch's laboratory (as used by the cattle quarantine service), from the Bureau of Animal Industry at Washington, from Parke, Davis & Company, and from the Guelph Agricultural College.

With each of these samples three guinea pigs were inoculated, and in no case was there a reaction, but in every instance where the same tuberculin was injected into animals known to be tuberculous definite and characteristic reaction resulted, thus showing that the statement was incorrect. (For details of this experiment see Dr. Higgins's report.)

Statements have been made by the opponents of tuberculin as a test, that it produces abortion in pregnant cows, impotency in bulls, interfered with the general health, and was unreliable as a test. If the reader will turn to the paper read by the

writer before 'The Animals Section of the British Congress' on tuberculosis, reproduced here, he will find the strongest evidence adduced to disprove these statements.

The following deductions in this connection were accepted by this Section without a dissenting voice.

(*a.*) Tuberculosis is essentially a contagious disease and ought to be classified and acknowledged by every country and state in the world as such.

(*b*) It is insidious in its character, and in only a few cases, comparatively, can it be diagnosed by physical examination, but in tuberculin we have a safe and reliable test by which even latent cases can be diagnosed.

(*c.*) That tuberculin is harmless ; it does not produce abortion in pregnant cows, impotency in bulls, or in any way produce any injurious effect on animals tested by it.

THE BRITISH CONGRESS ON TUBERCULOSIS FOR THE PREVENTION OF CONSUMPTION.

This vast assemblage of scientists, numbering about 2,700 representatives from all parts of the Empire and foreign countries, met at London under the patronage of King Edward VII. The opening meeting was held in St. James's Hall, Piccadilly, on July 22.

Field-Marshall, H.R.H. the Duke of Cambridge, president, in the chair, opened the congress on behalf of His Majesty the King.

The congress was divided into four sections, each having a president, several vice-presidents and honorary secretaries.

The membership was composed of honorary members, delegates and members.

Honorary members were persons nominated by any foreign government or university, or by the executive committee, delegated and ordinary members were other persons, British, colonial or foreign, who wished to attend, including representatives from governments or institutions within the British Empire.

Section I.

(State and Municipal.)

President—The Right Hon. Sir Herbert Maxwell, Bart., M.P., F.R.S.

The meetings of this section were held daily at St. George's Hall, Langham Place, and comprised five divisions, viz.:—

Division I.—Statistical.

II.—The notification of tuberculosis ; Prevention of tuberculosis during childhood.

III.—Influence of housing and aggregation ; The control of meat supply.

IV.—The international aspect of tuberculosis ; Control of milk supplies.

V.—The provision of sanatoria ; The role of hospitals and dispensaries for consumption in the prevention of phthisis.

Section II.

(Medical, including Climatology and Sanatoria ; meetings in the Royal Medical and Chirurgical Society's rooms, 20 Hanover Square.)

President.—Sir Richard Douglas Powell, Bart., K.C.V.O., M.D.

The following subjects were discussed :—

(*a*) 'What influence has climate on the treatment of consumption, and how far can cases be grouped for treatment in certain climates.'

(*b*) 'The therapeutic and diagnostic value of tuberculin in human tuberculosis.'

(*c*) 'Sanatoria for consumption.'

Besides these, numerous valuable papers were read and demonstrations given.

SECTION III.

(Pathology, including Bacteriology ; Meetings in Queen's Hall.)

President.—Prof. G. Sims Woodhead, M.D., F.R.S.E.

The following subjects were introduced for discussion :—

1. 'The Morpthological and Physiological Variations of the Bacillus Tuberculosis and its relations (*a*) to other acid-proof bacilli ; (*b*) to the ray fungus and other streptothrices.'
2. 'Tuberculin.'
3. 'Varieties of Tuberculosis, Morbid Aanatomy and Histology.'
4. 'Mixed Infection in Tuberculosis.'

And a large number of other papers on 'Tubercle Bacilli,' 'Infectivity of Milk,' &c.

SECTION IV.

(Veterinary—Tuberculosis in Animals ; Meetings in Marlborough Hall (Polytechnic), Regent Street.)

President.—Sir George T. Brown, C.B.

The following subjects were discussed :—

1. 'The Diagnosis of Tuberculosis in Animals during Life.'
2. 'Tuberculosis and the Milk Supply.'
3. 'Tuberculosis and the Meat Supply.'
4. 'The Legislation and other Measures necessary to combat Tuberculosis.'

The following distinguished foreigners took part in the discussions in this section:

Professor Nocard, of the Alfort Veterinary School.
" Bang, of Denmark Veterinary School.
" Arlong, of the Lyons Veterinary School.
" Thomassen, of Utrecht Veterinary School.
" Malm, delegate from the Swedish Government.

So far as this report is concerned, the interest largely centres in the discussion as to the identity of human and bovine tubercle bacilli, and the intercommunicability of tuberculosis between men and animals, and the paper read by Prof. Robert Koch and replied to by Professor John McFadyean.

For eighteen years the entire medical and veterinary professions have not doubted that consumption in children and old or weak persons was frequently produced by the ingestion or inhalataion of bovine tubercle bacilli, but more especially by means of milk from diseased udders of cows.

Recently, however, Prof. Theobald Smith and those making similar investigations and experiments, have concluded that, although similar, the two bacilli were not identical, the chief difference being observed in their relative virulence ; this we confirmed by experiments made under my direction by Dr. C. H. Higgins, at Outremont Station in 1899 (see report for that year). We found that when bovine tubercle was injected into the udder of one cow and human tubercle into that of another cow, the resulting swelling was greatest from the bovine cultures. Two healthy heifers were inoculated, one with bovine tubercle in the right lung, the other with human in the left ; the former died from generalized tuberculosis on the forty-second day, whereas the latter, inoculated with human tubercle, although she contracted the disease, showed but slight clinical evidence of it.

Five guinea pigs inoculated with the bovine cultures of tubercle died respectively on the 14th, 15th, 20th, 30th and 35th days: Three in which human cultures were used died in 18, 23 and 35 days generalized tuberculosis being found in each case.

In rabbits, five inoculated with bovine cultures died in 36, 70, 74 and 90 days, one surviving 3½ months. Of three inoculated with human cultures one only contracted the disease dying in 52 days, the other two being alive after two months.

In chickens inoculation with both bovine and human cultures failed to produce the disease.

Thus it will be seen that for some time it was well known to those working on this subject that bovine was much more virulent than human tubercle, yet no one had got results which justified them in coming to the conclusion announced by Prof. Koch, which centralized the whole interest of the Congress on his paper, viz.: the announcement that, 'if susceptibility really exists, the infection of human beings by milk or flesh of tubercular cattle, is but a very rare occurrence;' an announcement which fell like a bomb shell in the Congress which was not prepared for it and which was not accepted as correct.

Able replies were made by Lord Lister, Prof. Nocard, Prof. Bang and more particularly Prof. John McFadyean, Dean of the Royal Veterinary College, London, and the following resolution was unanimously passed; that 'in the opinion of this Congress Medical Health Officers should use the powers at their disposal and relax no effect to prevent the spread of tuberculosis by milk and meat.'

As the subject is of much interest as a public health question, although of minor importance so far as its virulence among cattle and other domestic animals is concerned, of which there is no doubt, whatever, I take the liberty of making the following extracts from both their papers.

Professor Robert Koch's Paper.

'Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, although hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.

'But another possibility of tubercular infection arises, as is generally assumed, in the transmission of the germs of the disease from tubercular animals to man. This manner of infection is generally regarded now a days as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this Congress also the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

'Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis, that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

'Even in my first circumstantial publication on the etiology of tuberculosis, I expressed myself regarding the identity of human tuberculosis and bovine tuberculosis with reserve. Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question un-

decided. In order to decide it, I have repeatedly resumed the investigations relating to it, but so long as I experimented on small animals, such as rabbits and guinea pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schutz, of the Veterinary College, in Berlin, I will tell you briefly some of the most important.

'A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle-bacilli taken from cases of human tuberculosis ; some of them got the tubercular sputum of consumptive patients direct. In some cases the tubercle-bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tubercular sputum almost daily for seven or eight months ; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had formed, in which few tubercle-bacilli could be found. This is exactly what one finds when one injects dead tubercle-bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones ; they were absolutely insusceptible to them.

'The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle-bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation period of about a week the severest tubercular disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin or into the peritoneal cavity or the vascular system. High fever set in, and the animals became weak and lean ; some of them died after a month and a half to two months, others were killed in a miserably sick condition after three months. After death extensive tubercular infiltrations were found at the place where the injections had been made, and in the neighbouring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tubercular growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to infection by the bacillus of bovine tuberculosis as they had proved insusceptible to infection by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

'An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experiment with swine. Six young swine were fed daily for three months with the tubercular sputum of consumptive patients. Six other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were all killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few gray nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuber-

culosis had, without exception (just as in the cattle experiment), severe tubercular diseases, especially tubercular infiltration of the greatly enlarged lymphatic glands of the neck and of the mesenteric glands, and also extensive tuberculosis of the lungs and the spleen.

'The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep and goats, into whose vascular system the two kinds of tubercle-bacilli were injected.

'Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chauveau, Gunther and Harms, Bollinger and others, who fed calves, swine and goats with tubercular material, one finds that the animals were fed with the milk and pieces of the lungs of tubercular cattle always fell ill of tuberculosis, whereas those that received human material with their food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie and Frothingham, and their result agreed with that of ours. The unambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of infection which exclude all sources of error, and carefully avoided everything connected with the stalling, feeding, and tending of the animals that might have a disturbing effect on the experiments.

'Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however, that these experiments should be repeated elsewhere, in order that all doubt as to the correctness of my assertion may be removed.

'I wish only to add, that, owing to the great importance of this matter, the German government has appointed a commission to make further inquiries on the subject.

'But, now, how is it with the susceptibility of man to bovine tuberculosis ? This question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the experimental investigation of it with human beings is out of the question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection-experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing tubercle bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the case.

'In reality, however, it is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first, *i.e.*, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post-mortem material of the Charité Hospital in Berlin, ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick's Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3,104 post-mortems of tubercular children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated, it is by no means certain that they were due to infection by bovine suberculosis. It is just as likely that

they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle-bacilli found in the tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite specially characteristic and convincing results. For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of the cases I have been able to investigate is but small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

'Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of heriditary transmission, and I therefore do not deem it advisable to take any measures against it.'

Professor McFadyean's Paper.

'As recently as a few days ago, when I was mentally arranging the material for the paper which I have now the great honour of submitting to this Congress, I was under the impression that it would not be necessary to formally prove that the term tuberculosis as it is now employed by medical men and veterinary surgeons relates to one and the same disease. I thought that I might ask my audience to accept it as proved, and generally admitted, that tuberculosis in man is caused by a single definite species of organism—the tubercle bacillus—that this organism is also the cause of the disease to which veterinary surgeons apply the term tuberculosis in the case of cattle and other domesticated species, and that there therefore existed a *prima facie* case against the germs formed in the bodies of tuberculous animals as a possible source of tuberculous disease in human beings.

'To-day, however, the position of any one who undertakes to discuss the intercommunicability of human and bovine tuberculosis is very different from what it would have been a week ago, for in the interval the greatest living authority on tuberculosis—the world-renowed discoverer of the tubercle bacillus, and the man to whom we are mainly indebted for our knowledge of the cause of tuberculosis—has declared his conviction that human and bovine tuberculosis are practically two distinct diseases. I do not know how far the reasons assigned by Dr. Koch for the opinion which he now holds on this question may have commended themselves to the members of this Congress, and I am overwhelmed at finding myself in a position which compels me to offer some criticism on the pronouncement of one the latchet of whose shoes I am not worthy to unloose.

'That bovine and human tuberculosis are identical diseases was generally supposed to have been finally determined by Dr. Koch himself, when he discovered that the human and the bovine lesions contained bacilli that were identical in morphological, tinctorial and cultural characters, and showed that the artificial cultures from both sources produced indistinguishable effects when they were employed to infect a variety of animals. The labours of hundreds of workers during the succeeding eighteen years produced nothing in serious conflict with the conclusion that human and bovine tuberculosis were identical diseases, but they brought to light what appeared to be additional evidence of this identity, such as the discovery that tuberculin produced a specific reaction in tuberculous cattle whether human or bovine bacilli had been

employed in its preparation. In short, the identity of the bacilli from the two sources appeared to be as firmly established as any other generally accepted opinion regarding the identity or non-identity of bacteria associated with disease in more than one species of animal. Since it thus appeared to be proved that the only difference between human and bovine tubercle bacilli lay in their accidentally different position—one being parasitic in man and the other in cattle—it was natural to conclude that, when circumstances were favourable for the transference of bacilli from one species to the other, human tuberculosis might have an animal origin, and *vice versâ*.

'Opinions varied as to the frequency with which this transmission of tuberculosis from one species to the other occurred, but practically never within the last eighteen years regarding the possibility and probability of such reciprocal infection. What are the grounds upon which we are asked to discard convictions that appeared to rest on such a solid basis? I shall endeavour to state them briefly, as I understand Dr. Koch's train of reasoning.

'(1) The bacilli found in cases of bovine tuberculosis are much more virulent for cattle and other domestic quadrupeds than the bacilli found in cases of human tuberculosis.

'(2) This difference is so marked and so constant that it may be relied upon as a means of distinguishing the bacilli of bovine tuberculosis from those of the human disease, even assuming that the former may occasionally be found as a cause of disease in man.

'(3) If bovine bacilli are capable of causing disease in man, there are abundant opportunities for the transference of the bacilli from the one species to the other, and cases of primary intestinal tuberculosis from the consumption of tuberculous milk ought to be of common occurrence. But post-mortem examination of human beings proves that cases of primary intestinal tuberculosis are extremely rare in man, and therefore it must be concluded that the human subject is immune against infection with the bovine bacilli, or it so slightly susceptible that it is not necessary to take any steps to counteract the risk of infection in this way.

'Now, with the utmost diffidence I venture to submit that at least one of the premises contained in this argument is not well founded, that the others have little or no bearing on the question, and that there still remain reasonable grounds for regarding tuberculous cows' milk as distinctly dangerous to human beings.

'It cannot be denied that what may be called bovine tubercle bacilli are as a rule distinctly more virulent for cattle and other domesticated animals than human bacilli, or that the results of experiments indicate that in natural circumstances there is little danger of cattle becoming infected from human beings. But it cannot be admitted that the low virulence of human bacilli for cattle proves, or even makes it probably, that bovine bacilli have only a feeble pathogenic power for man. That might have been held to be probable if it had been shown that bovine bacilli were very virulent only for cattle, but since it is well established that these bacilli are highly dangerous for such diverse species as the rabbit, horse, dog, pig and sheep, and, in short, for almost every quadruped on which they have been tried, it appears to be highly probable that they are also dangerous to man. At any rate, it is impossible to cite any ascertained fact relating to other bacterial diseases that makes the contrary conclusion probable. It is well known that the majority of disease-exciting bacteria are harmful to only one or two species, but all those that are common to all the domesticated animals are also pathogenic to man.

'With regard to the view that the difference between human and bovine bacilli in respect of virulence for cattle is of such a fixed and constant character that it may be relied upon to distinguish the one from the other, it need only be said that that

is very far from proved. It appears to be quite possible that what may be called the normal or average virulence of bovine bacilli for cattle may be reduced by passage through the human subject. Besides, there are very great differences in the virulence of tubercle bacilli found in animals of the same species, and if a low degree of virulence for cattle is to be taken as the distinguishing feature of human bacilli, there will be no difficulty in proving that the human disease is sometimes transmitted to the lower animals.

'The third proposition in Dr. Koch's argument is the only one which is really germane to the point at issue, viz., that only cases of primary intestinal tuberculosis can possibly have had their origin in infected milk or meat, and that "such cases are extremely rare." Dr. Koch refers to several large series of post-mortem observations that appear to justify this statement, and adds that he could have cited many more pointing to the same conclusion. Now, if it were a fact that all the statistics relating to this point were unanimous, it would have to be admitted that primary intestinal tuberculosis is rare in the human subject, and that cases of infection through milk are still rarer, though even then it might be advisable to take measures to prevent the few cases. But the statistics are not by any means unanimous, and those that are likely to appeal with most force to the people in this country are not at all in accord with those quoted from Germany. During the last few years the evidence obtainable from the post-mortem records of two of the largest hospitals for children in this country have been analysed with great care, in order to see what evidence they afforded as to the relative frequency of the different methods of infection in tuberculosis. In the case of the Hospital for Sick Children in Great Ormond Street this has been done by Dr. George Still, and in the case of the Royal Hospital for Sick Children in Edinburgh by Dr. Shennan. The conclusion at which Dr. Still arrived was that in 29·1 per cent of the cases of tuberculosis in children, primary infection appeared to have taken place through the intestine. That is very far from being an insignificant proportion, and it is a striking fact that Dr. Shennan arrived at an almost identical conclusion, and estimated that 28·1 per cent of the cases of tuberculosis among children in Edinburgh are due to alimentary infection. There does not appear to be any ground for supposing that there is a large margin of error in these statistics, as the number of cases dealt with was considerable (547 in the two series), and in both series the post-mortem appearances were interpreted in a way to which no exception can be taken. In face of these statistics it is not possible to assent to the statement that cases of primary tuberculosis of the alimentary canal are extremely rare. Precisely the contrary conclusion is the one that must in the meanwhile be drawn with regard to the state of affairs in this country, viz., that, at least in children, primary infection by way of the alimentary canal is comparatively common.

'I therefore submit that there is still a strong *prima facie* case against animal tuberculosis as a possible source of human tuberculosis, and it becomes necessary to consider whether there are any data from which one may estimate the extent of the danger to which human beings are exposed through the occurrence of tubercle bacilli in milk.

'The evidence in favour of the view that the ingestion of tuberculous milk is one of the causes of human tuberculosis includes a number of recorded cases in which the relationship of cause and effect appeared to be obvious. From the nature of the circumstances, evidence of this kind is very scanty, and it must be admitted that very few of the alleged examples are absolutely convincing. Tuberculosis is a disease that develops slowly, and, assuming for the moment that tubercle bacilli do occur in milk, and are a cause of disease in persons consuming such milk, it is obvious that, as a rule, the very act by which the infection is brought about destroys the only direct evidence of cause and effect that exists.'

LEGISLATION SUGGESTED FOR CONTROLLING AND ERADICATING TUBERCULOSIS IN ANIMALS.

(By Professor Duncan McEachran, McGill University, Canada.)

Read in Section IV., British Congress on Tuberculosis, London, England, July 26, 1901.

'The subject for discussion which I have the privilege of introducing to-day is one of very serious import, and one which requires to be very carefully considered in all its various bearings, last by proposing impractical enactments we nullify our good intentions and give rise (as has already been done in some countries and states), to bitter opposition by the owners of infected herds.

'Our efforts must be to educate the people, so that they themselves will voluntarily adopt our suggestions ; and, with the assistance of the state, bring about a gradual diminution in the numbers of tuberculous animals in our herds ; and the adoption by every stock-owner in the land of thorough preventive measures by which its re-introduction will be rendered impossible.

'The first step, therefore, which I would recommend is the publication and distribution among the masses, the agricultural population in particular, of information on the subject of tuberculosis. Much good work has already been done in this direction, but more must be done. If we look back for thirty-five years, when Villimin, Viseur, Chaveau, Gerlach, and others, were engaged in demonstrating the contagious character and transmissibility of this disease, and compare our scanty knowledge then with the vast amount of information which, thanks to Koch, Bang, Nocard and many others, we now possess, it will be easily understood why we, who have been in the field of active work in the practical sense as practitioners and advisers of our governments, have in early days hesitated to advise active control or eradication measures, and why the governments have been slow to pass enactments bearing on the subject.

'It was in 1882 that Koch first communicated the results of his investigations of the etiology of tuberculosis before the Physiological Society of Berlin, followed by further communications later. The knowledge of its transmissibility being due to a specific bacillus, led to much investigation and experimentation. The reports and contributions to the literature of tuberculosis have for many years filled our journals and book shelves to such an extent that no excuse is left for ignorance concerning the subject on the part of those interested in it.

'In citing evidence in support of any suggestions one may make as to legislation necessary to enable the people assisted by the government to control and subsequently eradicate tuberculosis from the lower animals, we necessarily must consider the measures tried by those countries, especially in Europe and America which have dealt with it. It is to be hoped that in the course of the discussion some new practical suggestions will be adduced which this congress can recommend for adoption.

'Until Koch demonstrated that tuberculosis was due to the invasion of an organism, the tubercle bacillus, communicated either directly from an infected person or animal, or by intermediate sources of infection, especially by buildings, pathologists were content to attribute its existence and extension to heredity; when, however, its real nature and its pronounced contagious character came to be known, both medical and veterinary practitioners stood aghast in contemplation of the thousand and one blunders which crowded their memories consequent on want of this knowledge.

'I remember well when, thirty years ago, I had temerity enough to read a paper based on the continental investigations above referred to, before the Medico-Chirurgical Society of Montreal, in which I ventured to say : "The experiments of continental investigators have clearly established the close relationship between tuberculosis in man and in animals, and the possibility of the disease being in many ways

transmitted from the one to the other ; and I am well aware that this disease is far more prevalent in the dairy herds supplying milk to the citizens of Montreal than is generally known, therefore, I feel it my duty to invoke the aid of this society in endeavouring to bring about certain sanitary improvements in connection with our meat and milk supply by the establishment of abattoirs under proper inspection; supervision of dairies and inspection of milk." Such was the limited information on these matters at that date that of about forty members present only one was in sympathy with the statements made. He was at the time a young man but recently graduated, who has since made his mark in the world of medical science ; I refer to Professor Wm. Osler of Johns Hopkins Hospital, Baltimore. He alone would admit even the probability of contagion or intercommunicability from animals to mankind, or from mankind to animals, a doctrine which was to sweep away their long-cherished belief in heredity as its sole cause.

'Pursuing this subject by close observation and numerous investigations of herds in Canada, in which this disease existed, instance after instance came to my knowledge of cases where the infecting animal was clearly traced to a diseased herd.

'Valuable herds were destroyed by its introduction, and several owners brought to the verge of ruin. At the period to which I refer, shorthorn cattle (Bates and Booth families) had attained fabulous values, £5,000 being a common price for a Duchess heifer, one cow being sold for nearly £9,000 in the State of New York. Many of them were tuberculous.

'The frequent discovery by clinical examination of tuberculous cattle imported from Britain passing through our quarantines, tuberculosis not being legally classified as a contagious disease at that time, obliged me to urge on the government the necessity for amending the Animal Contagious Diseases Act so as to include tuberculosis in the list of contagious diseases. This was done in 1886, thus enabling us to put a stop to such dangerous animals being admitted to the country to the serious detriment of our home herds.

'Members of my own and of the medical profession did not hesitate to say that this Act was premature owing to the etiology of the disease being not then sufficiently understood.

'Were proofs wanting of its contagiousness, I could furnish sufficient to convince the most skeptical but I would be wasting your time by their recital. I must, however, crave your indulgence for a few minutes while I make some general allusions to this characteristic of the disease.

'The infection of healthy animals we know takes place readily from cohabitation, the bacilli gaining entrance by the respiratory organs in most cases but by the digestive tract in many, especially in calves when suckled by diseased mothers and calves, pigs and other animals fed on milk, or on dairy by-products containing living bacilli ; in pigs when allowed to eat tuberculous matter found in carcasses and slaughter-house refuse given them as food, probably, too, in rare instances, from eating the flesh of tuberculous animals. It is to the buildings themselves, however, we must look for the chief source of infection, and to neglect of disinfection and sanitation must we attribute in a great measure the continuance of the disease and reinfections with which we are familiar. I could cite repeated instances of herds cleared out and new purchases made, with every care in purchasing, being followed by new cases of tuberculosis ; so that I feel that too much trouble cannot be taken by practitioners who are employed to eradicate this disease, to make sure that the buildings are aseptic and that sufficient air space is provided as well as a rational system of ventilation, whereby pure air is admitted and foul air driven out, also that properly trapped drains carry off the liquid excrements and prevent the return of noxious vapours.

'The importance of pure air and sunshine cannot be overstated in considering the prevention of tuberculosis. It is, however, a mistake to suppose that infection

will not take place when diseased and healthy cattle are brought together, even when these conditions exist in the very highest degree.

'I have seen tuberculosis prevalent in ranche cattle, few of which were ever under a roof, ranging on the foothills of the Rocky Mountains in Montana. I have known of a valuable herd of Polled Angus which were brought into the Peace River country in the far North-west of Canada, which proved to be tuberculous and was ultimately exterminated in consequence. In these and other instances which might be referred to, pure air and sunshine certainly prevailed, yet it did not prevent infection taking place when they were congregated in corrals, bunched together during fly time, or in infected sheds in winter.

HEREDITY.

'To eliminate heredity entirely from the causative factors would be an error, but we are safe in saying that it plays a very unimportant part in its extension. The rarity of the disease being found in calves at birth in all countries has been noticed by Professors Bang, Siedamgrotsky and others, and the immense success attending the rearing of calves from tuberculous cows by Bang's system in Denmark and other countries, including Canada, prove conclusively that it is not hereditary in the same sense as gout or insanity are known to be transmitted from parent to progeny.

'When visiting Professor Bang at Copenhagen three years ago he showed me two newly born calves sent in by an inspector ; in the livers of both tubercles were found.

'Uterine tuberculosis when seen is generally associated with generalized milliary tuberculosis, especially when it is peritoneal.

'The rarity of tuberculosis in the male genital organs precludes the probability of infection by copulation except in very rare instances ; hence, we infer that when the newly born calf is found tuberculous, infection has probably taken place within a diseased uterus.

'By far the most numerous infections have occurred after birth. Bang says : "I had occasion to observe more than 400 cases of tuberculosis either in fœtuses or newly born calves ; nevertheless the number of congenital tuberculosis has scarcely gone beyond 0·33 per cent of the killed calves, even in the most infected region."

'While intra-uterine infection from a diseased mother is occasionally seen, congenital tuberculosis plays a very unimportant part in the continuance and extension of the disease, compared with the many ways in which the essential factor in its production, viz., the tubercle bacillus, gains an entrance to the animal body, in other words, tuberculosis is a contagious disease, not an hereditary one as was supposed.

THE DIAGNOSIS OF TUBERCULOSIS.

'The clinical diagnosis of tuberculosis even by the most expert clinical examiner, except in advanced cases, is always unreliable, as tubercle may exist in such a stage as to be impossible of diagnosis by this means.

THE TUBERCULIN TEST.

'The discovery by Koch in 1890 of the production of fever, indicated by a rise in temperature in tuberculous animals into which he injected a sterilized glycerine extract of pure cultures of tubercle bacilli, while it produced no effect whatever when the animals were free from that disease, furnished us with a simple but very reliable diagnostic agent.

'The effects produced by this discovery on the commercial aspect of the business of the dairyman and cattle-breeder has been in many instances most disasterous.

Herds which were supposed to be free from disease were discovered by this test to be tuberculous, dairy businesses have been ruined, justly so we must admit, for no man has a right to sell milk or dairy products manufactured from it when derived from diseased cows, any more than a breeder of purebred stock has to sell animals suffering from a contagious disease from which recovery is the exception.

'The exposure by this means of the prevalence of the disease, especially in dairy cattle, naturally aroused anxiety in the minds of the guardians of the public health, a furor was thus created, and the public mind greatly disturbed when, in addition to this, its intercommunicability to human beings was made known.

'Hence we find many dairymen and cattlemen in all countries denouncing tuberculin and protesting against its use ; not all dairymen, nor all breeders however joined in this denunciation of what is well known to be a safe, harmless, but reliable means of detecting this disease even in its most incipient stages.

'In Canada during the past year from November 1 to November 1 there were 17,785 head of dairy cattle tested officially by voluntary application of the owners, on condition that the entire herd be tested and all reacting animals quarantined for life, without compensation. Of this number only 358 reacted, or about 2 per cent.

'What opposition we met with came from breeders who had suspicious herds, or herds which by private testing were known to be diseased ; it came chiefly from men who combined importing for speculative purposes with breeding.

'In some of these cases the importers, we have reason to believe, were not ignorant of the cattle being tuberculous, in others we fear the man who paid the money was a victim of imposition or gross neglect of his interests on the part of his agent.

'I will cite one instance of each case which came under my personal notice. (*a*). A herd of thriteen cattle arrived at the Point Lévis quarantine, two of them showing clinical symptoms of the disease. Examination of the chart which accompanied them showed that it was not genuine. It was therefore decided to test them, to which the person who had imported them objected, and while correspondence was going on one cow died from acute generalized tuberculosis ; of the rest all reacted but one and on post-mortem examination all were found tuberculous. (*b*). A gentleman of large means decided to import a herd of useful but not high-priced shorthorns. He sent an agent to purchase and import them. This agent was instructed to use every precaution by testing and otherwise to secure animals free from tuberculosis. They were bought in Ireland without testing them, they were brought to Scotland, there tested ; two were rejected, the balance shipped to Canada with a chart which was not quite satisfactory, and on retesting them by request of the owner five out of thirteen reacted.

'Personally, I believe with Prof. Nocard that tuberculin does not lie ; how is it then that so many tuberculous cattle come to us in America, accompanied by charts and certificates of health ?

'If the importer is a party to fraud, then he should be severely dealt with, if negligent, then he should pay the penalty of his negligence, for he has no right to import animals suffering from a contagious disease.

'It is possible that agents or middlemen deal in suspected cattle which are bought knowingly by the one class of importer, or foisted on to the other ? Is the professional man employed to test for export imposed on by previous tuberculination nullifying or at least rendering uncertain his honestly applied test ? Are all such men above suspicion (my own experience in a few instances in Canada compels me to say no) or is it the tuberculin that is at fault ?

'When we meet with reactions varying from forty to ninety per cent in cattle certified as healthy, as is found in both Canadian and United States importations, such questions force themselves on us, and are sufficient explanation of why both governments have each decided to keep a professional man in Britain on whose charts alone will cattle be allowed to pass through our quarantines without retesting.

REACTION.

'We are often asked by importers and testers in Britain what reaction we consider indicates tuberculosis ? Experience has taught us that it is not the extent of the rise in temperature so much as its character taken in conjunction with attendant circumstances. Ordinarily a rise of 2 degrees F. above the highest normal is due to tubercle being present ; but the single occurrence during the day of such a rise may be due to some accidental circumstance. A typical reaction is arched, the maximum temperature occurring about the seventeenth hour, falling to normal about the twenty-fourth hour or sooner in many cases. The character of the reaction may be altered by copious draughts of cold water, or a lowering of the body temperature from any cause ; so also does the raising of the body heat from such causes as flies, atmospheheric heat and scarcity of water, all of which produce variations in the reactions. In addition to which might be mentioned applying the test when the animal is excited from any cause such as driving cows in from the field to the stable, railroad journeys, steamboat conveyance, change of climate, change of byre, bulling, stage of the disease (in advanced cases often no reaction follows), and what to us is most important, the uncertainty of reaction for months after injection of tuberculin.

As I said above, tuberculin can be almost absolutely relied upon if properly used, there is no other diagnostic agent to be compared with it, yet it is capable of much abuse, and is often improperly used.

OBJECTIONS URGED AGAINST THE TUBERCULIN TEST.

'In my opinion, there is not one argument used by cattle-owners or importers against its use tenable.

'I have never known a single instance of a person owning a healthy herd lift his voice against it, but I could multiply instances of men becoming almost maniacal in their denunciation of the test since it has been required in the international live stock trade between the United States and Canada as well as in importations from Europe, men whose herds when tested reacted sufficiently to warrant one in suspecting previous knowledge from private testing on their part.

'With a view to get at the truth of some of their objections, I sent circular letters to inspectors throughout Canada, in which I asked replies to the following questions, suggested by newspaper discussions on the subject :—

'1. Do you know of any cases in which the use of tuberculin as a test has produced abortion ?

2. Do you know of any instance in which a bull has been rendered impotent by the use of tuberculin ?

3. Do you know of any case in which the general health of the animals has been injured by the tuberculin test ?

4. How many cattle have you tested during the past year ?

5. How many post-mortem examinations have you witnessed of animals condemned in consequence of having reacted to the test ?

6. In how many instances did you fail to find tubercle ?

'The replies are all negative to the first three questions ; to the fourth, they aggregate 22,023 head ; to the fifth, 579; and to the sixth, ten and one doubtful.

'Prof. Leonard Pearson, State Veterinarian for Pennsylvania, states in his report for 1899 that "of 4,400 post-mortem examinations made tuberculosis was found in all but eight animals that had reacted."

'I also sent similar questions to a few of the farmers who had most experience with it. The following replies will represent the others :

'In answer to the first question : Do you think that the test injures cattle in any way, he says, "No, I do not think there is the least injury in the tuberculin test.

Our herd of over fifty head have been tested three years in succession, and I fail to notice any injurious effects whatever from the test."

'In answer to question No. 2 : Have you ever had any bad results that you could attribute to the use of tuberculin ? he says, "None. I am using a bull that has been tested five years in succession, and is seven years old, and a more active, healthy animal I never saw, a very sure animal, you may judge, by our dairy of forty-two cows there is only one farrow. As to abortion, we do not have near the trouble that we had before we commenced testing, for I consider that we have a healthy herd now. Previous to the testing of our dairy, we had very serious trouble with abortion."

'"1. I do not know of any case wherein the use of tuberculin has produced abortion, and on our farms we have tested cows at all stages, up to within a very short time of calving.

'"2. I have never known of a case wherein a bull was rendered impotent or injured in any degree whatever by the use of the tuberculin test.

'"3. I have not known of a single case wherein the application of the tuberculin test affected prejudicicusly in the slightest degree the general health of animals tested therewith.

'"4. We have had between three and four hundred cattle tested.

'"5. I have not personally witnessed any post-mortem examinations, but I have had reports from the veterinary surgeon who does our work on every animal which was condemned as a result of the test and in almost every one positive traces of the disease were found."

'From these facts we deduce the following :—

'(*a*) Tuberculosis is essentially a contagious disease, and ought to be classified and acknowledged by every country and state in the world as such.

'(*b*) It is insidious in its character and in only a few cases comparatively can it be diagnosed by physical examination ; but in tuberculin we have a safe and reliable test by which even latent cases can be diagnosed.

'(*c*) That tuberculin is harmless ; it does not produce abortion in pregnant cows, impotency in bulls or in any way produce any injurious effect on animals tested by it.

METHODS ADOPTED BY DIFFERENT COUNTRIES.

'Some years ago in Massachusetts compulsory testing was tried but was found to be impracticable, and met with strong opposition.

"Belgium adopted somewhat similar methods with similar results. It had to be given up, and at present the killing is restricted to animals in which the diagnosis can be made by clinical examination.

'In Switzerland free testing is practised, all clinically diseased are slaughtered, reacting animals are marked by cutting out a triangular portion of the ear.

'In France, immediate slaughter of clinically diseased animals, and slaughter within one year of reacting ones.

'In Germany, tuberculin is furnished free, and monetary aid is given to those who adopt the Danish system and otherwise resort to prophylactic measures for its eradication. In most of the German states it is required to sterilize the creamery and dairy products and their by-products, skim and butter-milk.

'In Denmark free testing is done on voluntary application, clinically diseased are killed, the others are divided into healthy and reacting ; these are separated in different buildings or partitions are used to divide the byres ; in one section the healthy, in the other the diseased are placed. The reacting ones are bred from, the calves are reared on milk, from healthy cows or pasteurized milk, or milk which has been heated sufficiently to kill the tubercle bacilli. The success of this plan has been fully demonstrated by Prof. Bang.

'In America, both in the United States and in Canada, for a number of years all cattle imported from Europe were tested in the quarantines. A few years ago importers urged that the practice too often led them into serious losses, viz., the value of the diseased animals as well as freight and other expenses incurred, and discouraged, as a consequence, importation generally. To meet the views of importers the Canadian Minister of Agriculture ordered that a number of veterinarians throughout Britain be selected, whose charts of tests would be accepted without testing again in Canadian quarantines. This plan worked very badly, as numbers of diseased cattle were imported ; several valuable herds being found clinically diseased were slaughtered.

'The United States had similar experiences with British charts of testing. This is regrettable, as both countries acknowledge the great results obtained by British breeders in producing excellent cattle, knowing as they do, that on no other spot on earth can cattle of equal merit be produced. There is something in the soil, and the air of the sea-girt isle so favourable to the production of high class bovines, that breeders abroad must come to Britain for fresh blood to keep up their herds, otherwise marked degeneration is soon apparent. For this reason each country, rather than prohibit importation altogether, has appointed a veterinarian to do the testing, and on their charts alone cattle are admitted to both countries without being tested in quarantine.

'In Canada testing is done at government expense, when voluntary application is made for testing the whole herd, and reacting animals are quarantined for life.

'Bang's system is coming much into practice in Canada. In a few herds it has been successful in a remarkable degree ; no compulsory measures have been tried.

'Tuberculosis exists in Canada to a limited extent only. No statistics for the entire Dominion are available, but the following figures indicate this. Testing has so far been confined almost entirely to dairy herds, and was employed in the most of these owing to suspicion or knowledge of infection —

Year	Tested.	Reacted.
1897-98	6,516	412
1898-99	16,882	451
1899-1900	17,785	358

THE FOLLOWING REGULATIONS ARE ENFORCED BETWEEN THE UNITED STATES AND CANADA.

Breeding Stock.

Sec. 21. All cattle to be admitted for breeding purposes shall be accompanied by—

(*a*) A declaration made by the importer that they are actually for breeding and no other purposes.

(*b*) A certificate signed by a government veterinarian, specially selected and appointed for this duty, that they have been subjected to the tuberculin test and found free from tuberculosis. Such certificates must show the date of testing and chart of reaction, with a description of the animal, giving age and markings. The importer may be required to swear that the certificate refers to the animal represented.

(*c*) A certificate of inspection signed by a government veterinarian showing that the animals are free from contagious disease, and that no contagious disease of cattle (excepting tuberculosis and actinomycosis) exists in the district whence they came.

(*d*) When not accompanied by such certificates the animal or animals must be detained in quarantine one week and subjected to the tuberculin test.

(*e*) Should they be found tuberculous they must be returned to the country from which shipped or slaughtered without compensation.

Fat Cattle and Cattle for Feeding, Including Range Cattle for Stocking Ranches.

Section 22. This class of animals shall be accompanied by a certificate of inspection, signed by an official veterinarian, showing that the animals are free from contagious disease, and that no contagious disease of cattle (excepting tuberculosis and actinomycosis) exists in the district whence they came.

Settlers' Cattle.

Section 23. Settlers' cattle when accompanied by certificates of health to be admitted without detention, when not so accompanied they must be inspected. Inspectors may subject any cattle showing symptoms of tuberculosis to the tuberculin test before allowing them to enter.

Section 24. Any cattle found tuberculous to be returned to the United States (or killed without indemnity).

'The following extracts from copies of the laws and regulations governing the control and for the eradication of tuberculosis in individual states furnished me by the authorities may be cited with advantage, and can be found more in detail in a bulletin recently issued by Dr. Salmon, Chief of the Bureau of Animal Industry at Washington.

STATE LEGISLATION WITH REFERENCE TO BOVINE TUBERCULOSIS.

Illinois.—Legislation under Board of Live Stock Commissioners. Their rules and regulations are as follows :—

All cases reported to board. When physical condition indicates tuberculosis all exposures are quarantined till tested under direction of the board. Rise of two degrees or more (if in opinion of veterinarian in charge is due to tuberculin) constitutes reaction, and such animals must be isolated and held in quarantine till slaughtered and examined post-mortem. Rise of 1·5 and less than 2 degrees is suspicious, must be isolated and quarantined for retest. Maximum indemnity not to exceed $75.

Classification for compensation :

Class A.—No lesions. Full appraisal.
" B.—Incipient disease, 75 per cent of appraised value.
" C.—Infected for one year, 50 per cent of appraised value.
" D.—Infected for two years, 35 per cent of appraised value.
" E.—Infected for three years, 25 per cent of appraised value.
" F.—Infected for more than three years, 15 per cent of appraised value.

Should proceeds of carcass exceed percentage valuation, owner receives full amount.

Definite legislation needed with money to carry out provisions. Time not ripe for drastic measures.

Iowa.—No special legislation. Tuberculin used where necessity and public safety demand. Reacting animals tagged and quarantined, provision being made that they may be shipped to any abattoir in the state for slaughter subject to inspection by bureau inspector, state veterinarian or one of his assistants. No remuneration save what animal will bring as fertilizer. Thirty per cent of the reacting animals are condemned on post-mortem.

Work that is done, is done thoroughly, but more is needed.

Kansas.—No specific laws. Must be tested on entering the state. May be brought in for show purposes without test, but if sold must be tested before allowed to stay in state. At the present time there is litigation as to legality of rules and regulations.

Kentucky.—No special legislation. May be dealt with by State Board of Health. Animal cannot be condemned until examined by competent veterinarian. Indemnity is not provided for.

Maine.—Commission of three persons appointed by governor. Necessary quarantine enforced, half compensation for animals destroyed providing they have been in the state a year or more. Compensation not to exceed $100 for pedigreed or $50 for grade stock. Appraisal not being accepted by owner, rigid quarantine enforced.

Tuberculin test not officially designated.

Regulations sufficient, but not enough funds for enforcing properly.

Massachusetts.—General laws on contagious diseases cover tuberculosis. Compensation to full value not to exceed $40 in any case. Tuberculin restricted to cattle brought in from without the state, excepting upon written request of the owner and on such animals as are condemned as being tuberculous by a competent veterinary surgeon. No compensation granted unless rules regarding disinfection, cleanliness, ventilation, light and water supply are complied with as directed by the commission. Owners using tuberculin are not entitled to indemnity for animals which react, unless the testing is done by its Board of Cattle Commissioners or by its direction.

Regulations work well and good work done, but more money could be spent to advantage.

Michigan.—General law on contagious diseases ; no special on tuberculosis. State veterinarian is acting under general law against tuberculosis. On complaint of local board of health or individuals, suspected cases of tuberculosis are tested. Reacting animals are destroyed or rigidly quarantined. No provision against entrance of tuberculous cattle. Governor has power to prevent but commissioner has not seen fit to protect the state.

Minnesota.—General legislation applies, empowering local or state board of health to act. Two tuberculin tests are required to condemn a tuberculous animal, and must be given within three months and in not less than two months. No further legislation. Experience shows inefficiency of procedure now in vogue.

Montana.—Towns of 5,000 or over to have meat and milk inspector, who must be a graduate of reputable veterinary medical college. All animals supplying milk to the public must have a certificate of tuberculin test, and are inspected every month. Laws just passed, and it is thought that they will prove sufficient if carried out to the letter. Not much tuberculosis in the state, only about 5 per cent.

New Hampshire.—General law relates to tuberculosis. Co-operation is general with federal bureau. Indemnity, full appraised value, to be paid by towns which are reimbursed four-fifths by the state. Such animals must have been owned within the state three months before detection of disease. Cattle entering the state must be tested under authority of board of commissioners. Pasturage permits granted on physical examination by competent veterinarian, a graduate of a recognized school. Massacuhusetts cattle, tagged by the Massachusetts Cattle Commission, allowed to go to New Hampshire for pasturing and return to Massachusetts without test.

Upon request by cattle-owner, he may have his herd officially inspected by the board. If inspector deems it necessary, tuberculin is used, and owner must conform to measures prescribed by board. Test applied at state's expense and half value for all animals reacting. Precautionary measures to stamp out disease at owner's expense.

Experience shows that enforcement of sanitary measures is as important as the destruction of diseased animals. Ventilation, light, exercise of animals, and disinfection regarded as the most important part of the work. Progress is being made in suppression. Radical measures not needed.

New Jersey.—Commission of seven, composed of president and secretary of Board of Agriculture, and five others appointed by the president. Examine herds on request, but tuberculin test is optional with the commission. Condemned animals appraised at market value, and three-fourths paid to owner. All cattle from without the state are tested.

Gradually lessening prevalence by educating farmers as to its character and the need of greater care in breeding, stabling, sunlight and ventilation.

State of New York.—Tuberculin applied upon written request under conditions prescribed by Commissioner of Agriculture. Commissioner may order test, holding a reacting animal in strict quarantine. He may condemn, quarantine or slaughter when tuberculosis is found on physical examination. Compensation shall not exceed $60 for thoroughbred and $40 for grade, providing animal is not found to be diseased at the post-mortem. If the animal is diseased with disease for which it was killed or other dangerously contagious or infection disease, no compensation is allowed.

Animals entering the state passing the federal authorites are allowed to proceed.

North Dakota.—Tuberculosis under general legislation. State and district veterinarians can deal with subject. Cattle from without the state must have certificate of health or be examined by state official. Tuberculin test not specified.

Pennsylvania.—All animals entering the state must be tested with tuberculin. Other testing left to discretion of board. Compensation not more than $25 for infected grade and $50 for infected registered stock. Measures for combating this disease, as well as others, at discretion of board, and are not inflexible.

Rhode Island.—Appraisal for 'scrub' animal $50, grade $75, and registered $100. In event of animal being found infected at autopsy, state pays half value, but if healthy, full value. Animals must be owned within the state at least three months previous. Cattle coming into the state must be tested with tuberculin.

Utah.—Cattle having tuberculosis shall not be kept by dairymen, and shall be killed by the dairy and food commissioners. There is no provision for the tuberculin test or for indemnity.

Vermont.—Tuberculin test without expense on application, and whole herd must be tested. Such herds cannot admit new animals unless they undergo the test. Reacting animals must be killed and buried or burned at the expense of the owners. Owners retain the hides. Board regulates right to retest when considered necessary. Rules of board where herds are tested regarding disinfection must be observed. Cattle entering the state from without must be tested by person approved by board and expense borne by owner. Animals killed by written order of the board, appraised, such appraisal not to exceed $40. Post-mortem held, and if tuberculosis or other disease dangerous to public health is found, owner receives half appraised value. Such animal shall have been in the state six months previous to discovery of disease.

Experience shows that if rules are followed for disinfection, disease is stamped out. Persuasion used by board to induce testing of suspected herd. Measures radical enough at present, for the public must considered and be in sympathy with the movement rather than antagonistic.

Virginia.—Tuberculosis is classed as a highly contagious and infectious disease. Board of Control of Agricultural College has power to enforce such measures for its control as are deemed necessary.

'Educate the people by furnishing them with the most important scientific and practical facts known about the disease. Much good has been done in Canada by the distribution broad-cast of bulletins among the agricultural population on this and kindred subjects.

INSURANCE.

'At the VIIth International Veterinary Congress, held at Baden Baden two years ago, Professor Siedamgrotzky suggested a system of insurance which, if it could be carried out, would be a common sense way of lessening individual losses consequent on eradication by slaughter of clinically diseased and reacting animals.

'This is, however, surrounded by many practical difficulties, yet it is well worthy of the consideration of this congress.

'An effort should be made to provide an indemnity fund by this or some other way, the public purse contributing a liberal share, otherwise I fear the progress made in eradication will be slow.

'In the state of Illinois, United States of America, indemnity is paid by the state, on a plan which is worthy of imitation.

'A maximum value is fixed at, say, £15. Diseased cattle are classified as follows after being slaughtered :—

Class A in which no lesions are found	Full	appraised	value.
" B in incipient stage	75 p. c.	appraised	value.
" C infected for one year	50 "	"	
" D infected for two years	35 "	"	
" E infected for three years	25 "	"	
" F infected for over three years	15 "	"	

'Should the proceeds of the sale of the carcass exceed the percentage valuation, the owner is paid the full amount so received.

SUGGESTED LEGISLATION.

'No legislation will accomplish the end in view unless the measures are such that the public are in sympathy with them rather than antagonistic to them.

'I. Tuberculosis should be included in the list of contagious diseases. Tuberculous animals should consequently come under the provisions of the Animal Contagious Disease Act, but the local authorities should have power to allow the sale and movement of such parts of the carcasses as are known not to carry contagion, such as hides, hoofs, horns and hair, thus preventing unnecessary loss.

'II. All foreign animals admitted for breeding or dairy purposes should be tested by the tuberculin test. Tuberculous animals should be prohibited from entering.

'III. Tuberculin should be controlled, and none but qualified veterinarians be allowed to use it ; and all reacting animals should be reported, marked and quarantined.

'IV. All animals showing clinical symptoms of tuberculosis, especially disease of the udder, lungs, uterus or bowels should be killed at once ; and all scrub and grade animals reacting should be killed within six months. Pure bred cattle may be bred from under Bang's system in quarantine for life.

'V. All testing other than of imported animals should be by voluntary application for a test of the entire herd, and the expense should be borne by the state; a reaction of 2 degrees to be understood to indicate tuberculosis, 1½ degrees as suspicious. Suspicious animals to be quarantined and retested in three months, unless clinical symptoms develop, when they would be at once condemned. The government to have the right to order retest when considered necessary.

'VI. Disinfection of premises should be ordered by special regulations, the carrying out of which will be superintended by government officials.

CIRCULAR *re* TUBERCULIN TESTING.

'The following circular is about to be printed and distributed throughout Canada for the information of the public.

TESTING CATTLE FOR TUBERCULOSIS BY GOVERNMENT VETERINARIANS.

In consequence of dissatisfaction having been expressed by the Bureau of Animal Industry of the United States Government at Washington with the results of testing of animals purchased in Canada for importation into the United States, an agreement was entered into in February, 1901, between Secretary Wilson, of the United States Department of Agriculture, and the Honourable Sydney Fisher, Minister of Agriculture for Canada, whereby all testing of cattle intended for the United States must be done by permanent official veterinarians duly appointed and paid by the government. This necessitated the cancellation of a large number of nominations of veterinarians throughout the Dominion for the purpose of testing, as well as increasing the number of permanent officials, who alone are authorized to test for export to the United States. A list of these in each province is herewith appended.

TIME AT WHICH TESTING IS TO BE DONE.

Cattle for export will be tested at any time due notice is given to the Department of Agriculture at Ottawa, so that the first available officer may be sent to make the test.

TESTING OF CATTLE NOT FOR EXPORT.

Practical experience has demonstrated that for many reasons it is undesirable to test dairy stock from March to October. Many cannot be tested, owing to being advanced in pregnancy ; the disturbance of the cattle in removing them from the fields into byres, change of food, heat, flies, all interfere with the reliability of the test ; besides, much valuable time is lost by owners and inspectors, when the work is done during the busy season. Therefore, no testing will be done of dairy stock or of any stock not for export, except from October 1 to March 1, or at the period of the year in which the cattle are regularly housed. Applications should not be sent to inspectors direct. When so sent, delays and disappointments occur, whereas, when sent to the department, a proper disposition is made. Should it be found that more applications are sent than can be complied with by the permanent staff, a sufficient number of qualified local veterinarians to test animals not intended for exportation to the United States will be temporarily employed.

TESTING IN GREAT BRITAIN FOR IMPORTATION TO CANADA.

It was considered necessary for the protection of Canadian cattle to take special measures to prevent tuberculous animals being imported, and for this purpose an official veterinarian was appointed and located in Glasgow. The United States government took similar action, their inspector being located at London, and, for mutual convenience, it was agreed that each country would accept the certificates of either inspector, and cattle arriving accompanied by a certificate of test signed by either of the inspectors need not be retested before leaving quarantine. When not accompanied by these certificates, they will be tested by the quarantine superintendent before being allowed to leave the quarantine.

SESSIONAL PAPER No. 15

LIST OF OFFICIAL VETERINARIANS AUTHORIZED TO TEST FOR EXPORTATION TO THE UNITED STATES.

Prince Edward Island—

W. H. Pethick, V.S., Central Bedeque.

Nova Scotia—

William Jakeman, D.V.S., Halifax.

New Brunswick—

J. H. Frink, V.S., St. John.

Quebec—

J. A. Couture, D.V.S., Quebec.
V. T. Daubigny, D.V.S., Montreal.
A. E. Moore, D.V.S., Montreal.
C. H. Higgins, D.V.S., Montreal.

Ontario—

Wm. Stubbs, V.S., Toronto.
J. H. Tennent, V.S., London.
Geo. H. Higginson, V.S., Rockland.

Manitoba—

Chas. H. Little, V.S., Winnipeg.

North-west Territories—

J. C. Hargrave, D.V.S., Medicine Hat.

British Columbia—

J. B. Hart, D.V.S., Vancouver.

OFFICIAL VETERINARIANS FOR TESTING IN GREAT BRITAIN.

J. G. Rutherford, V.S., care of Canadian Government Agency, Glasgow, Scotland.
Tooie A. Geddes, V.S., care of U. S. Consul General's Office, London, England.

List of United States Official Veterinarians furnished by Dr. Salmon, November 27, 1901, as 'A correct list of inspectors to whom are referred practically all of the inspections and tests of cattle for export to Canada.'

Bennett, D. S. E., 44 Kilby Street, Boston, Mass.
Corlis, Dr. W. S., Watertown, N.Y.
Cowie, Dr. Chas., Ogdensburg, N.Y.
Cumming, Dr. David, 719 Park Street, Port Huron, Mich.
Dealman, Dr. J. F., Sault Ste. Marie, Mich.
Huntington, Dr. F. W., 37 Union Street, Portland, Me.
Green, Dr. L. K., Detroit, Mich.
Ketchum, Dr. F. D., South, St. Paul, Minn.
Knowles, Dr. M. E., Helena, Montana.
Mayne, Dr. H. D., Malone, N.Y.
Morin, Dr. C. L., St. Albans, Vt.
Potter, Dr. H. T., Calais, Me.
Russell, Dr. F. L., Orono, Me.
Volgenau, Dr. E. L., Live Stock Exchange Building, East Buffalo, N.Y.
Ward, Dr. G. W., Newport, Vt.
Zink, Dr. C. H., Live Stock Exchange Building, East Buffalo, N.Y.

A. L. JARVIS,
Acting Deputy Minister of Agriculture.

I take the liberty of reproducing here the following extract from the *Farming World* of September 4, 1900, on Canadian cattle quarantines :—

THE CATTLE QUARANTINE SYSTEM OF CANADA.

'Every agriculturist in Canada has an interest in the health of animals, but fortunately for him it has so far been a passive one. Unlike his brother farmers in European countries, he has enjoyed almost complete immunity from the ruinous effects of contagious diseases in animals; probably most of us have not asked why. We purpose in a short article written up from authentic records which we have been able to consult, to inform the younger portion of our readers how the cattle quarantine originated.

'The first record of any suggestion of cattle quarantine is found in a letter addressed to the Minister of Agriculture, dated Montreal, September 28, 1875, signed Duncan McEachran, which we here reproduce :

MONTREAL, September 28, 1875.

'SIR,—The consideration of contagious diseases and infectious diseases with a view to prevent their introduction into this country is a subject to which my attention has long been directed. Having had considerable experiences of them in Britain before coming to this country and during my recent visit to Europe I visited several farms to familiarize myself with foot and mouth disease, and from numerous conferences with professional men on the subject, I gathered what practical information I could relative to them and the best means of dealing with them. By the careful study of the works of Fleming, Gamgee and others, I hope I have prepared myself to be of some service to the department in taking the proper measures in endeavouring to preserve our valuable herds of farm stock free from contagious diseases of a preventable character.

'It is a well-established fact that "cattle plague," "pleuro-pneumonia," "foot and mouth disease," "small-pox in sheep," were all introduced into Great Britain by stock imported from infected districts on the continent of Europe, that they spread entirely in the lines of commercial communication, and that they are propagated by contagion and contagion alone.

'For want of proper preventive measures, these diseases have from time to time been introduced and spread over the British Isles, bringing death, or almost equally ruinous deterioration in value of the entire stock, as for the time being to paralyze the agricultural industries of the country, and create dearth and destitution among the labouring classes. The annual loss to the mother country is counted by millions of pounds sterling.

'Our country is essentially agricultural ; the stock interests represent a very large proportion of our wealth. So far, we have enjoyed almost perfect immunity from such diseases. This fact alone has directed the attention of other countries to Canada as a rich source of meat supply, and the industry properly preserved and judiciously encouraged, will doubtless soon become a rich source of revenue.

'That active steps are necessary need not be doubted. When we know for a fact that in England, owing to the unusual prevalence of such diseases, it is almost impossible for animals to be shipped from an uninfected district, and that it is quite possible for an animal on being shipped, presenting no symptoms by which the disease could be recognized, the stage of incubation (period elapsing from introduction of disease germ till development of symptoms) in foot and mouth varies from twenty-four hours to twelve days ; cattle plague, usually about five or six days, but by many is said to extend to sixteen or eighteen days ; pleuro-pneumonia, from thirty days to ten or sixteen weeks, and, further, that it is a fact that hay, straw, blankets, halters,

clothing of attendants, &c., may be the medium of conveying and propagating the contagion, the presence of which in these articles no inspection or examination can determine till the effects declare the fact. That the effect of a visitation of the least virulent of the above diseases to a herd, by death, loss of flesh and injury to the constitution, cessation of the secretion of milk, abortion, want of conception, &c., reduces its value to one-third or one-fourth. That these diseases, with proper precautions, are preventible, I have every reason to believe. The length of time elapsing from the time of shipment to their landing in the country, with the tendency for sea-sickness to lessen the incubative period, are all favourable to an early development of the symptoms after landing, and, thereby, enable us to shorten the duration of quarantine. Our cold, clear climate during winter, and our dry atmosphere during summer, in my opinion, would make such diseases more controllable than in the humid, heavy atmosphere of Britain. But, on the other hand, we know from experience of epizootics among horses, once the disease is propagated, these very circumstances favour the spreading in a most extraordinary degree.

'I have taken the views of our most extensive importers, and find that a system of quarantine would meet the aproval of all of them.

'Should the department desire it, I will be happy to lay before them, either by letter or interview, some suggestions as to how this could be carried out without disturbing the cattle trade of the country, but on the other hand, securing it by preserving a clean bill of health to our valuable herds, believing, as I do, with Professor Gamgee : "That it is of the highest importance to protect the property of our people, to prevent an improvident waste of life and money and submit a choice of evils to some interference with the freedom of the subject whenever the doings of one man or a few are likely to injure the million," an interference which would be approved of most by those whom it would most affect. Doubtless, the carrying out of a thorough system of inspection, quarantine and disinfection would occupy time and cost money, but the advantages to the country would be very great.

'The above is most respectfully submitted by

Your obedient servant,

(Signed) D. McEachran.

The Hon. The Minister of Agriculture,
Ottawa, Ont.

'Fortunately, this letter was backed up by the leading cattle-breeders and importers of that date, particularly the late Hon. George Brown and the late David Christie, Senator Cochrane and others, and resulted in the acceptance of the proffered service and the taking of the initial steps, at first permissive detention with the consent of the owner, followed shortly after by the utilization of Fort No. 3, at Point Lévis, and the erection within its yards of suitable sheds for receiving and keeping cattle, sheep and swine, first for eight days, but shortly after, ninety days for cattle, on account of the prevalence of pleuro-pneumonia in Britain, the period of incubation for which being usually three months' duration.

'The utility of a quarantine system being demonstrated, stations were subsequently established at Halifax, N.S. ; St. John, N.B. ; Charlottetown, P.E.I. ; Sarnia, Ont. ; Emerson, Man. ; Estevan, Assiniboia ; St. Mary's, south of Macleod, Alberta ; Huntingdon and Victoria, B.C. ; besides numerous inspecting stations at which no regular stations have yet been established—all of which have been extremely valuable in preventing the introduction of diseases of animals.

'The extension of this exportation of live stock necessitated the supervision of the steamships as to space and ventilation and the inspection of the stock before being shipped. For this purpose special inspectors were appointed at the shipping ports.

'It was found necessary to investigate all reports of disease within the country and to deal with them with a view to eradication and prevention. Such diseases as sheep scab, parasitic mange in cattle and, particularly, tuberculosis.

'Hog cholera and swine plague have been actively dealt with from time to time. This necessitated the appointment of no less than twenty-six permanent inspectors and 209 appointed, but only employed as required. Pathologist and assistant pathologist—an experiment station and bacteriological department all contributed to the efficiency of the Cattle Quarantine System of the Dominion.

'It now forms a most important branch of the Department of Agriculture, the value of which to the stock-breeders more directly, but no less to the cattle shippers, railroads, steamships, bankers and merchants generally, would be difficult to estimate, as is always the case in dealing with prevention of loss ; the following figures from the statistical year-book, 1897, however, may furnish food for thought :

"In Canada 45 percent of the population is engaged in rural pursuits. The railroads depend on agriculture for one-fourth of the freight they carry and the canals one-third. Canada's merchant marine depends chiefly upon the produces of the farms and ranges, and more than one-half of the total exports are agricultural products.

Exports for the year 1897.

	Value.	
Horses	$ 1,710,922	
Cattle	7,159,365	
Sheep	1,002,011	
Swine	4,053	
Other animals and poultry	111,349	
		$ 9,937,723
Agriculture products		45,545,869
Total		$55,533,592

"There being no census of animals for the Dominion taken since 1891, we were obliged to make use of the figures obtained that year to illustrate the magnitude of our animal population :

	Number.
Horses	1,470,872
Cattle	4,120,586
Sheep	2,363,761
Swine	1,733,630

"To these probably 10 per cent may be added to represent the figures of this date.

"If our live stock and their products assume such large proportions, and their exportations form such an important item of our foreign trade now, what may they not reach in the future? When, by the rising tide of immigration, our great fertile regions now unpeopled are brought under cultivation and made to yield of their abundance, it will swell the volume of exports several hundred per cent more than they are to-day, both in animal and agricultural products. We can by very little thinking foresee the vast interests at stake in this country, which is destined to become the foremost food-producing country on the globe."

'The following statistics from Fleming's Veterinary Sanitary Science and Police will serve to illustrate what has happened where preventive measures were neglected :

'Cattle Plague.—Great Britain, 105,566, 279,023 reported sick, 233,622 died or were killed, 40,165 recovered.

"Contagious Pleuro-Pneumonia.—In Great Britain, from 1834 to 1880, it is estimated that there perished considerably more than 1,000,000, head valued at $60,000,000.

"In Australia.—The losses during thirteen years were about 30 to 40 per cent of the whole number of cattle, or about 1,404,097, valued at $42,500,000.

"Foot and Mooth Disease.—Although it is not a very fatal disease, it is very contagious, and usually affects nine-tenths of the animals in the district and entails great losses from loss of flesh, loss of milk, resulting sterility, embarrassment of traffic, cost of nursing, cost of inspection and other heavy expenses.

"It is estimated that in Great Britain during 1872 the money loss amounted to at least $65,000,000.

"Tuberculosis.—In my opinion, this is the greatest scourge of the farm—sparing scarcely any species of our domestic animals, affecting more especially cattle, pigs and poultry—intercommunicable from animals to man and from man to animals. Insidious to a degree, incurable as a rule, invading our homes in the milk supplied for nourishment, the virulent bacilli working their deadly effects on our little ones, our invalid friends, or it may be, our own bodies, well may we exclaim, "In the midst of life we are in death." No reliable statistics of the extent to which this fell destroyer exists in the herds of this country have been taken, no general testing of the cattle has been attempted, but of some 10,000 head tested the percentage is small compared with older countries and more populous centres, yet sufficiently large to render the responsibility of the government onerous indeed. Fortunate it is that this disease, while communicated from cattle to the human subject readily when the milk drawn from diseased udders is ingested without sterilization, it is not readily communicated in any other way to any except to those who are in constant attendance on cattle suffering from tuberculosis of the throat or lungs, who are thus exposed to inhalation infection.

"Apart, however, altogether from human infection, this disease is one which causes enormous losses in nearly every dairy country in the world, or wherever cattle are housed, and fresh cattle frequently brought into the herd, as is the case in most dairy herds. To these bovine scourges must be added contagious diseases of other species of domestic animals.

"Glanders in horses, if left unchecked, would decimate our horses, and cause, as it does in the old countries of Europe, serious losses.

"Hog cholera is a most virulently contagious and fatal disease. $20,000,000 a year is estimated to be lost in the United States from its ravages.

"Scab in sheep, where sanitary measures are not understood, causes immense losses from loss of wool, from death and expenses in dipping and caring for the diseased flocks."

"What does it avail if the breeder spends valuable time and money in improving his flocks and herds if he is not protected by wise preventative measures from such diseases as would frustrate and nullify all his efforts? What though professors of dairying teach and farmers adopt the most complete systems of butter and cheese production, if the milk-supplying herds are suffered to sicken and die from preventable diseases ?"

POINT LEVIS CATTLE QUARANTINE.

This quarantine station, which was first opened for the reception of imported cattle in 1876, and was for some years confined to a few sheds, hurriedly constructed on a cheap and temporary basis within the yard of Fort No. 3, had to be rapidly extended to meet the requirements of the large importations of breeding stock which took place during the early eighties, until the government land surrounding the Fort was covered extensively with sheds and yards.

The prevalence of contagious pleuro-pneumonia in Great Britain, and its unfortunate importation to the quarantine in 1886 as well as repeated importations of foot and mouth disease, illustrated in a forcible manner both the necessity for a quarantine

station and its efficiency to deal successfully with contagious diseases when they were found among imported stock. Twice foot and mouth disease and once, contagious pleuro-pneumonia were imported ; each time the disease was prevented from spreading beyond the herds which brought it or those which had contracted the disease by contact on board ship.

As a result of these unfortunate occurrences, more stringent quarantine measures had to be enforced which had the effect of lessening the numbers of imported animals and for a number of years very few were imported either by Canadian or United States cattlemen. During this period of several years the buildings, from disuse, got considerably out of repair ; several which had been burned in stamping out contagious pleuro-pneumonia were not rebuilt, and others were pulled down, partial repairs being made to the best of the sheds and fences. The revival of high-class cattle breeding, in the United States and Canada which has taken place to a large extent within the past few years, the eradication of C. P. P. from the American herds, and its almost complete extripation from the herds of Great Britain, has given an impetus to importation and necessitated the rebuilding of most of the fences and several of the buildings, and the erection of several new ones. This work was done by the Public Works Department, and the opportunity presented was taken advantage of to rearrange the yards and buildings for convenience and isolation. I have much pleasure in reporting that the work so far as completed has been done in a satisfactory manner, and also in appending a diagram of the quarantine prepared and kindly reduced by a draughtsman of the Public Works Department , a study of which will show that ample provision is made for perfect isolation by avenues and roads from 50 to 60 feet wide separating the various yards. The whole of the grounds being inclosed by a close boarded fence 6 feet high, with an interval of 60 feet between it and the yard fence, wherever it is necessary the yard fence is also close boarded and 6 feet high. Excellent accommodation is provided for quarantining 464 cattle and 300 sheep ; this, if necessary, could be extended. It is needless to say that the buildings although not expensive in character are admirably adapted for their purpose, and are roomy, thoroughly lighted, and ventilated. They are kept scrupulously clean, being disinfected and whitewashed on the removal of cattle or sheep at the expiry of their quarantine period.

This quarantine continues to be largely patronized by United States importers who are attracted to the St. Lawrence route, which is a favourite one with them largely owing to the excellent accommodation afforded at this quarantine.

In addition to the quarantine proper, there is a shed near the wharf where the cattle are taken to, temporarily, when landed from the steamships. It accommodates 50 cattle. To this shed are taken any animals showing signs of illness of any kind on arrival, whence they are taken later to the quarantine, provided they do not show any signs of a contagious disease. This shed is most useful, however, for receiving stock from late or early arriving ships. The road from the landing shed, or steamer, is a semi-private one, little used on account of its steepness—very rarely do any domestic cattle pass over it. Under the precautions taken no domestic animals can come into contact with either incoming or outgoing stock. Twenty-five years' experience has demonstrated that it is perfectly safe for the movement of cattle to and from the quarantine.

I have pleasure in reporting that so far as its capacity goes, the suitability of arrangement, and isolated position and the high, dry, healthy location, leaves little to be desired, and this is the opinion of nearly all the importers and a large number of representative men, veterinarians and others, who have visited it officially to report on its arrangements, both to the United States government, State Cattle Commissioners and representatives of cattle-breeders, and others in Great Britain and elsewhere.

To complete the repairs it will be necessary to replace some more of the old fencing by new, improve the roads, improve the arrangements for distribution of water, and put down a few sidewalks, all of which I hope will be done during the coming year.

SESSIONAL PAPER No. 15

A NEW DISEASE IN HORSES—ENZOOTIC FISTULOUS WITHERS AND POLL-EVIL.

The following reports have been forwarded from British Columbia of a disease which is new to the veterinary profession, an enzootic form of abscess and fistulae in the withers and polls of horses, and which is also stated to have been seen in cattle.

Similar reports have reached the Bureau of Animal Industry at Washington, D.C., from veterinary practitioners at Perry, Iowa, and Albany, Georgia.

This disease is common enough, but is known only as the result of bruising of the withers by badly fitting saddles, and injuries of the poll leading to the formation of abscesses and fistulae. So far, no investigation has been made in the United States or Canada which has explained this peculiar occurrence.

(*Extract from Dr. J. B. Hart's letter.*)

'VANCOUVER, August 27, 1901.

'Dr. Gibbins, the Provincial Inspector, has interviewed me several times *re* a disease which the Hon. Mr. Prentree and others claim to be contagious or at least infectious. This disease (or reports of same) seems to be confined to the upper Fraser valleys, Chilcoten, Nicola and Douglas lake districts. It makes its appearance in all kinds of horses and has been seen in a few cattle. As nearly as I can judge from the reports it has every appearance of fistulous withers. The first symptom is a swelling over or on one side of the dorsal vertebrae, and in some cases lower than the cartilaginous prolongation of the scapula, may involve one or both sides, and is accompanied by the usual heat and swelling with intense pain. The swelling bursts and suppurates, usually the discharge is from the top. The pus burrows deeper and deeper and the characteristic sinuses of fistulae form.

'Animals rarely recover as they are far removed from medical assistance and are usually vicious.

'The Doctor has been up on two occasions and previous to his last visit I requested him to secure for me some pus from an authentic case. This, however, he failed to do, but says he expects to receive some very soon. I intended to send it to you and have it examined microscopically. The points that appeal to me most strongly are 1st. The recurrence of this trouble yearly in spring and fall; 2nd. All kinds of horses, two years old running out, pack-horses, saddle horses, harness and draught horses, brood mares that have not been bridled for years, &c., being affected. 3rd. The confident stand the owners take as to its infectious nature against Dr. Gibbons's stated opinion as to its purely traumatic causes and non-infectious nature.

'I asked the doctor to write and send you copies of the correspondence with the owners.'

(*Report by Provincial Veterinarian Johnson Gibbins, M.R.C.V.S.*)

'VANCOUVER, September 30, 1901.

'SIR,—I wish to draw your attention to a disease among horses in the Chilcoten and Cariboo country, as you will see per inclosed which I send for your guidance, and to see if you can come to any other conclusion than one of fistulous withers.

'I was up there in July to make an investigation, but I could come to no other conclusion than fistula.

'Truly it seems very strange that so many horses should be affected in this district, both old and young, mild and domesticated, many that have never been broken; it seems almost unaccountable. As you see by inclosed it has even been observed in cows. I did not see this myself, neither did I discover anything in the shape of eggs as this same individual describes. I tried my best to get some pus when up there, but

in this I was frustrated, there being no cases just at that time in which I could get any pus, however, I left small bottles in which those interested promised to forward me some sealed up, but as yet I have not received any ; hence my delay in not writing you together with your being away at that time.

'There are also a few cases in which the polls are affected in the same way, resembling poll-evil.

'Now, in many cases different individuals are satisfied that the trouble is of a traumatic character, then again others will have no alternative than its being infectious and contagious as they say most emphatically that the malady is not from any injury whatever.

'I may say that I have interviewed all the professionals on the coast and they one and all seem puzzled, but can come to no other conclusion than "fistula."

'I shall be pleased to hear your opinion, and if there is anything further you desire to know in this connection, I shall be most pleased to give it.'

(Signed) JOHNSON GIBBINS.

I have the honour to be, sir,
Your obedient servant,

The Honourable
The Minister of Agriculture,
Ottawa.

D. McEACHRAN,
Chief Inspector.

No. 15.

REPORT UPON BOVINE TUBERCULOSIS AND OTHER MATTERS.

(J. GEORGE ADAMI, M.A., M.D., F.R.S.E., Professor of Pathology, McGill University, Pathologist to the Department.)

J. H. R. Molson, Pathological Laboratory, McGill University,

MONTREAL, October 31, 1901.

SIR,—I have the honour to forward to you the report of Dr. Higgins, Assistant Pathologist to your department, upon the work accomplished in connection with his duties and more especially upon the observations on tuberculosis carried out by him under my supervision at Outremont and in my laboratory.

That work has been seriously interrupted by his temporary appointment last year as bacteriologist in charge of the Plague Laboratory at William Head, Victoria, B.C., under the quarantine branch of your department. I had the opportunity to inspect the work carried on by him there and can only speak in terms of high praise for what he managed to accomplish under great difficulties. Most unfortunately this appointment was for an indefinite period, a period which lasted over the greater part of the year, delaying our researches at Outremont and arresting them at a time when, after long preparation, they promised to lead to valuable results, results which now have been forestalled by other workers in Europe and in the United States. Called away at a few hours' notice, Dr. Higgins had no time to go with me to Outremont to show me exactly what he wished doing with the various animals, nor to leave instructions as to the course to be pursued with the cultures and other material which he was working on in the laboratory. Nor, possibly, had he been able to do this, could I have continued his work in a satisfactory manner, for it is a peculiarly difficult matter for one observer in pathology to take up and carry on the individual pieces of work in progress by another observer. Thus, expecting that he would return within the course of a few weeks, during which time little harm would ensue by his absence, neither he

nor I were willing that I or any other should continue his observations, and the waiting to know what had been determined concerning his future continued for so long a period that unavoidably the cultures and many of the series of observations upon animals were rendered valueless, nor has it been possible since to start them anew.

By referring to our previous reports it will be seen that our work at Outremont had led us specially to consider the modes of infection by tuberculosis among cattle and the relationship between the human and bovine tuberculosis. That bovine tuberculosis can be transmitted with fair ease from cow to cow there is now no doubt. Dr. Higgins has shown how the bacilli of tuberculosis can be demonstrated in the matter coughed up or violently expelled from the mouths and nostrils of infected cattle by placing sheets of glass over the fronts of the stalls of animals showing symptoms of pulmonary tuberculosis. Upon these sheets the fine particles of sputum expelled on coughing, lodged and became fixed so that the contained tubercle bacilli could later be stained and recognized under the microscope.* (Vide Report of the Minister of Agriculture for 1899, pp. 144-147.)

In Dr. Higgins's present report he records some interesting observations upon the effects of cohabitation, namely, of placing healthy calves in the same stall with infected animals. The interest in this series of observations lies especially in the fact that the infected animals showed very little clinical evidence of tuberculosis ; they reacted, it is true, to tuberculin, but for some months one of them failed to give the tuberculin test. Notwithstanding this there was evidently at certain periods active progression of the disease in the lungs and the cohabiting calves became infected. (Vide p. 141.)

The earlier observations by Drs. Martin, Higgins and myself had further confirmed those of workers in other countries upon the infectiousness of the milk of tuberculous cattle for calves and animals of the laboratory and had convinced us that, contrary to the views of most English observers, though confirmatory of the work of earlier German observers (whose methods, however, are not regarded as having been wholly satisfactory) and of the more recent work of Ernst, of the United States, tubercle bacilli capable of infecting guinea pigs and rabbits may be present in the milk of cattle not suffering from udder tuberculosis. These observations have since been fully confirmed by Kempner and Rabinowitsch, who employed methods similar to ours.

Taking all the facts at our disposal into consideration, we could not believe that milk containing a minute number of tubercle bacilli could be dangerous for man, and this led us to lay down that Nocard's view must be taken as correct, namely, that only when there is definite tuberculosis of the udder is milk to be regarded as dangerous and liable to convey infection to man, and to urge that every animal showing such tuberculosis must be immediately and absolutely condemned. It was these results and considerations which led us inevitably to study the relationship between human and bovine tuberculosis.

In my last report (Report of Minister of Agriculture for 1889, p. 139) I detailed the main facts at our disposal, pointing to the conclusion that the bacilli causing tuberculosis in fowls, man and cattle, vary one from the other, so that it is possible to distinguish them by the features presented by one and the other when cultivated outside the body, as again by their effects when inoculated. I pointed out that they must not be regarded as distinct species ; that, for example, tubercle bacilli of man if placed under certain conditions in the bodies of fowls, after the course of months gradually as they grow assume altered characters, so that now they become virulent

* This had been previously demonstrated in connection with phthisis and the spread of human tuberculosis by Flügge, of Breslau, who employed similar means, but not until these observations has it been demonstrated for infection for animals. Since the publication of our report, Dr. Ravenel, of Philadelphia, has demonstrated the same fact by a modification of the method employed by Dr. Higgins.

for fowls (which before they had not been) and undistinguishable from the bacilli of avian tuberculosis (Nocard). I also reported that we were executing observations along the lines to demonstrate if possible that human tubercle bacilli retained in the bodies of cattle, gradually took on the characters and the peculiar virulence or infectiousness of the bovine bacilli. It is this particular series of observations that has been interrupted by Dr. Higgins's absence, and this most unfortunately ; for, as will be familiar to all, the address by Professor Koch before the British Tuberculosis Congress in July, dealt in a sensational manner with this very matter of the relationship between the human and bovine tuberculosis, and it has left the impression upon many that human and bovine tuberculosis are to be regarded as absolutely distinct diseases, due to what are, to all intents and purposes, distinct though allied species of bacilli. It is a matter of no small regret to us that we were unable to demonstrate at the proper time that this was not the case.

Into a discussion of Professor Koch's address I will enter more fully later ; in the meantime, I would point out how important it is for the settlement of this question and for the calming of the public mind as to the exact and intimate relationship between tuberculosis of cattle and of man respectively, to prove that the bacilli of human tuberculosis can be converted into bacilli having all the characteristics and properties of those found in cattle, and I would beg that authority be given to us to re-enter upon this, to me, most important and convincing series of investigations. Here I would call attention to the fact that so far as we have gone, we are firmly convinced that in general and under ordinary conditions, tubercle bacilli obtained from the bodies of infected cows show distinct differences from those obtained from human beings. As already reported, Dr. Higgins two years ago found that a culture of tubercle bacilli obtained from man had no effect when inoculated into a cow, herein confirming the observations of Frothingham (1897), Theobald Smith (1898), and others. Now he is able to report another case to the same effect (*Vide* pp. 138 & 139). Two very similar animals, both reacting to tuberculin, but both in good condition and showing no clinical evidence of the disease, were inoculated in the udder with like quantities of cultures of human and bovine bacilli respectively, in order to determine whether active tuberculosis could be set up. As mentioned in previous reports, we have been unable to obtain in this neighbourhood any cattle presenting this form of udder disease. Further, we desired to determine whether existing tuberculosis acted as a preventive to second infection of the same disease. Some of Koch's earliest observations on guinea pigs rather seemed to point in this direction, and it may be noted that in man the existence of active syphilis is a preventive of second infection with that disease, and syphilis and tuberculosis appear to belong to the same group of chronic granulomatous infections.

The animal inoculated with bovine tubercle bacilli soon showed abundant tubercle bacilli in her milk, and all the evidences of extensive tuberculosis of the udder ; it is interesting to note that this second infection appears to have remained local, and not to have set up a rapidly generalizing tuberculosis ; she was killed at the end of twenty months, when slight and apparently fairly generalized but arrested tuberculosis was found in various lymph glands, associated with extensive tuberculosis of the udder. These results are, at least, suggestive. The other animal (inoculated with the human bacilli), when killed at the end of nineteen months, had ceased to react to tuberculin, and exhibited merely old encapsulated tuberculous foci in the lungs and in certain glands, with small, more recent tubercles in the lungs and liver, while at the site of inoculation there was not a sign of tuberculosis, the udders being completely free from the disease.*

* It is worthy of note that Lartigau in his studies upon the variation and virulence of the bacillus tuberculosis in man (Journal of Medical Research, N.S., Vol. 1, No. 1, 1901, p. 156), describes a case of a man in which there was found extensive miliary tuberculosis in both lungs, bronchi and upper air passages, while the right knee joint showed an old, very fibrous

The observations here recorded (p. 137) on the fate of human and bovine tubercle bacilli contained in permeable capsules within the peritoneal cavities of cattle and other animals, seem to indicate that a year is too long to allow the vitality of bacilli so treated to be preserved, although I should note that Ravenel has been able to gain cultures after eleven months' retention in such capsules. In these celloidin capsules the bacilli cannot escape into the system, nor can they be directly acted upon by the cells of the body. They are nourished by the body juices, which diffuse through the walls of the capsule, while the toxic substances given off by the bacilli in their growth are, as indicated by Dr. McCrae's work upon typhoid bacilli in this laboratory (Journal of Experimental Medicine, vol. V., 1901, p. 635), diffused out into the tissues. Whether the death of the imprisoned bacilli is due to the gradual accumulation of antitoxic and antibacterial substances of the body juices which, diffusing into the capsule, act upon the bacilli, or whether there is gradually formed a fibrous wall around the capsules, rendering diffusion inwards and outwards more and more difficult and nourishment of the imprisoned bacilli more and more imperfect, must, for the present, be left an open question.

Another line of research which has for some months been carried on by Dr. Higgins cannot here be reported save as being in progress, I refer to the methods for gaining the rapid development of the tubercle bacilli. One of the greatest difficulties in the study of experimental tuberculosis lies in the length of time requisite to gain culture of the bacilli. When adequate cultures of the bacilli are not obtainable under three weeks to a month, it will be understood how slow the advance of research, of necessity, must be. Already in several laboratories during the last two years, attempts have been made, with more or less success, to gain rapid growth by the employment of media other than those introduced by Koch, Roux and Nocard, which have been in general use until the present. I can only state that the methods here elaborated promise success in this direction.

With regard to Dr. Higgins's report upon other investigations, that upon anthrax explains itself. In reference to his detection of typhoid bacilli in contaminated water from the ss. *Montezuma,* it is worthy of note that this is one of the very few cases in which the presence of the typhoid bacilli have been surely detected in infected water.* The earlier reports of such detection must be discredited, for only of late years have we come to realize how peculiarly difficult it is to distinguish between the typhoid and the colon bacilli, this latter being a common contamination of water. In Dr. Higgins's hands Hankin's method, carefully carried out, gave positive results, which were confirmed by the Widal test, a fact deserving of note because recently certain German observers have sought to discredit the method.

ON THE RELATIONSHIP BETWEEN HUMAN AND BOVINE TUBERCULOSIS.

As one of the delegates from the government, it was my privilege to attend the British Congress on Tuberculosis, held in London, in July of this year. It is no exaggeration to say that at that congress every other contribution was thrown into the shade by Koch's remarkable address, as again, that no utterance on a medical subject has caused so general an excitement throughout the civilized world since Koch's previous announcement concerning tuberculin.

As the matter in that address which has caused so much sensation, is directly in line with the trend of our observations during the last three years, it is fitting that I should here discuss fully the stand taken by Koch, and this more especially since his

tuberculosis in which no tubercle or tubercle bacilli would be detected on section. From the region of the knee and from the lungs he obtained cultures of differing virulence, that from the acute pulmonary tuberculosis being of great virulence for rabbits and guinea pigs, the other of distinctly attenuated type. As he suggests, these findings indicate inhalation infection wholly independent of the old focus of attenuated tubercle bacilli in the knee.

utterances have had a distinctly unsettling effect upon those interested in the arrest of tuberculosis among cattle, and have a bearing upon the legislative measures to be taken to arrest the spread of the disease in the community at large.

When in 1884 Koch published in the second volume of the 'Mittheilungen,' of the German Imperial Health Office, the classical account of his researches upon the tubercle bacillus and the relationship of the same to different forms of tubercular disease in man and animals, he laid down with the greatest precision that there was but one form of tubercle bacillus, that grape disease (Perlsucht) in cattle, tubercular phthisis or pulmonary consumption in man, and tuberculosis in the domestic animals, are caused by one and the same micro-organism. This view was not based upon isolated observations—he studied 19 cases of miliary tuberculosis in man, 29 cases of pulmonary phthisis, tuberculous ulcers of the tongue, tuberculosis of the womb, testicles, &c., 21 cases of scrofulous lymphatic glands, 13 cases of tuberculous joints, 10 cases of tubercular bone affections, 4 of lupus—all these in man—and 17 cases of grape disease in cattle ; while he made experimental inoculations with the bacilli obtained from all these cases into some 273 guinea pigs, 105 rabbits and numerous other smaller animals, including rats, cats, dogs, pigeons, hens, &c. It was a most remarkable and exhaustive piece of work. And when he declared after all this prolonged study of years, that the organisms isolated from man and cattle were identical, it is not surprising that his view was almost universally accepted, although this was counter to the teaching of Virchow, the great German pathologist, who, since 1863, had laid down that tuberculosis in man and grape disease in cattle were two distinct diseases.

From Virchow's address to the Berlin Medical Society, July 29, 1901 (Berliner Klinische Wochenschrift, August 5, 1901, p. 819), it would appear that at the Charité-Hospital in Berlin they have from time to time collected material from cases of human peritoneal tuberculosis, showing massive tubercular growths quite unlike the ordinary tuberculosis of the abdominal cavity in man, and resembling more those characteristic of the bovine disease, thus indicating, so far as I follow Virchow, that despite the general acceptance of the view enunciated by Koch and the disrepute into which his own earlier opinion had fallen, Virchow had, since 1884, still upheld that earlier opinion regarding the want of identity between the two diseases. But for years Koch's conclusion was unreservedly accepted by pathologists in general, by veterinarians and those interested in hygiene, the view, namely, that one form of bacillus causes all forms of tuberculosis in the different species of animals.

The first check to these views came from Italy and France, when it was shown by Mafucci (1889), and by Cadiot, Gilbert and Roger (1890), that the bacilli obtained from fowls, pheasants and other birds suffering from tuberculous disease, grow more readily, and in their growth and in their action upon the animals of the laboratory, differ markedly from the tubercle bacilli isolated from man (vide report for 1899, p. 139), and in 1890, at the International Congress in Paris, Koch admitted these differences. As I have already pointed out (ibid) the researches of Nocard and Roux have clearly indicated that these differences in properties are not due to the existence of two absolutely distinct species of bacilli, but to the fact that bacilli grown and passed from member to member of one species gradually assume characters different from those assumed by the bacilli of like origin, infecting and passing through members of another species of animal. The extreme example of this difference in the characters of different races of tubercle bacilli is to be met with in fish. It has been found by more than one observer that fresh water fish, such as carp, fed for a long period with the sputum of human tuberculous patients may eventually develop swellings of an inflammatory type from which tubercle bacilli can be obtained, growing easily at the ordinary temperature on the usual media employed for this purpose (whereas tubercle bacilli obtained direct from man only grow at the body temperature and then only with difficulty). These piscine bacilli when inoculated into rabbits and guinea pigs are found to be remarkably attenuated and lessened in their virulence. I learn that Professor

Harrison and Mr. Ross, of the Guelph Agricultural College, have repeated and confirmed these experiments.

It is not surprising therefore that differences have been made out between the tubercle bacilli derived from cases of tuberculosis in man and cattle respectively. As a matter of fact, as already reported, Theobald Smith has more especially called attention to the differences in the cultures and the appearance of the bacilli, differences which we have been able fully to confirm (ibid., p. 139), while several observers have noted either that tuberculous sputum from man when fed to calves, had no effect upon them, or, that pure cultures of the bacilli isolated from lesions in man were similarly without effect, at most leading to a localised disturbance at the point of inoculation with little or no liability to lead to generalized disease. (Chauveau in France, Gunther and Harms and Bollinger (1894), in Germany, Sydney Martin (1895), in England, Frothingham (1897), Theobald Smith (1898), and Dinwiddie (1899), in the United States.

We so fully accepted these results in 1899, that we only tested the matter upon one heifer, using large quantities of human tubercle bacilli and obtaining no result (ibid., p. 147). The control heifer which received a like inoculation of bovine bacilli died of generalized tuberculosis in forty-two days. But one English observer, Crookshank, obtained positive results, as I have previously noted (ibid., p. 140), and as Crookshank himself acknowledged at London Congress, his case is peculiar, and is to be explained not as a pure tubercle infection, but as an example of a mixed infection, the suppurative disturbance and consequent lowered resistance in the calf favouring the multiplication of the tubercle bacilli and the development of a generalized tuberculosis. It may be noted here that in one of Dr. Higgin's capsule experiments, where the capsule containing human tubercle bacilli ruptured, a few small tubercles were found in the neighbourhood. These were clearly arrested in their development.

Thus, previous to Koch's address, it was well known to those interested in the subject, that differences existed in the bacilli obtained from man and the cow ; that human tubercle bacilli only occasionally and under special conditions are capable of causing tuberculosis in cattle, and that these do not cause nearly so virulent and rapid a development of the disease when inoculated into rabbits and guinea pigs. The question had already been mooted as to whether bovine tubercle bacilli, being more virulent for the lower animals, are also specially virulent for man, or whether the reverse was the case, so that passage of the tubercle bacilli through a series of cattle, while leading these to be more dangerous for cattle and for the animals of the laboratory, renders them less capable of setting up infection in man.

In this connection, before coming to deal directly with Koch's address, it is but right that I should here note that in August, 1899, at the meeting of the Canadian Medical Association at Toronto, I delivered an address upon bovine tuberculosis and its significance, and upon the possibility of its eradication in Canada, in which I cautiously drew attention to the fact that the evidence in favour of the view that bovine tuberculosis is transmissible to man, was not so strong as was generally thought to be ; that while cases did exist of such transmission, they were few in number ; and I concluded, therefore, that inasmuch as it was with great difficulty that human tuberculosis was conveyed to cattle and *vice versa*, it was therefore quite possible for us here in Canada to proceed to eradicate bovine tuberculosis from district after district of the Dominion, and this, even when measures for eradicating human tuberculosis were either ineffective or not put into action. This paper was taken at the time, by certain critics, to mean that I did not believe that tuberculosis was transmitted from cattle to man ; that I never stated, nor have I since then believed or urged this to be the case. I believe that it is transmissible under certain favourable conditions, but that it is comparatively rarely transmitted. Throughout I was most careful to point out that this question of the transmissibility of the disease from one species

to the other should not in any way lead to lessened restrictions or diminished endeavours to eradicate tuberculosis from cattle, but that, on the contrary, as already stated, the less the extent of transmission from the one species to the other the greater the hope of eradicating the disease from among our cattle, the greater the hope also of materially benefiting the Canadian farmer.

PROFESSOR KOCH'S ADDRESS.

In discussing Dr. Koch's celebrated address, it is but right, in the first place, to call attention to the fact tha it was not directly, but only incidentally, upon the subject of the relationship of human and bovine tuberculosis, the full title given by him being 'The Combatting of Tuberculosis in the Light of the Experience that has been gained in the Successful Combatting of other Infectious Diseases.' The distinguished writer laid down, in the first place, that the most important lesson we have learnt from experience is that it is a great blunder to treat pestilences uniformly. He pointed out that in the case of the plague, for example, we have learnt that human plague is dependent upon rat plague, that the real transmitters of the disease are rats, and that, therefore, to stamp out the disease, we have to destroy the rats in a region ; that with cholera the main propagator is water, and that, in combatting this disease, water is therefore the first thing to be considered. The compulsory muzzling of dogs has had remarkable effects in freeing Great Britain from hydrophobia, and leprosy has from early days been combatted by isolation. Thus, to select the right means of eradicating tuberculosis, we must determine what is the root of the evil, and must not squander force in subordinate, ineffective measures, and, to arrive at a satisfactory result, we must, in the first place, inquire how infection takes place in tuberculosis.

He showed that we have abundant evidence that the disease is mainly set up by inhalation, and that the sputum of consumptive people is to be regarded as the main source of the infection with tuberculosis. He took it that upon this point all were agreed. He next asked whether there were not other sources also copious enough to demand consideration in the combatting of tuberculosis. Taking these into consideration, he indicated that hereditary tuberculosis, while not absolutely non-existent, is so extremely rare that in considering practical measures, we are at liberty to leave this form of origin entirely out of the question. It was at this point he discussed next the possibility of tubercular infection by the transmission of the germs of the disease from tubercular animals to man. Here it would be well to give his exact words :—

'This manner of infection is generally regarded nowadays as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this congress also the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

'Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

'Even in my first circumstantial publication on the etiology of tuberculosis I expressed myself regarding the identity of human tuberculosis and bovine tubercul-

osis with reserve.* Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question undecided. In order to decide it, I have repeatedly resumed the investigations relating to it, but so long as I experimented on small animals, such as rabbits and guinea pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schütz, of the Veterinary College in Berlin, I will tell you briefly some of the most important.

'A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle-bacilli taken from cases of human tuberculosis ; some of them got the tubercular sputum of consumptive patients direct. In some cases the tubercle-bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tubercular sputum almost daily for seven or eight months ; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had formed, in which few tubercle-bacilli could be found. This is exactly what one finds when one injects dead tubercle-bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones ; they were absolutely insusceptible to them.

'The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle-bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation-period of about a week the severest tubercular disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin or into the peritoneal cavity or the vascular system. High fever set in, and the animals became weak and lean ; some of them died after a month and a half to two months, others were killed in a miserably sick condition after three months. After death extensive tubercular infiltrations were found at the place where the injections had been made, and in the neighbouring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tubercular growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to infection by the bacillus of bovine tuberculosis as they had proved insusceptible to infection by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

'An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experiment with swine. Six young swine were fed daily for three months with the tubercular sputum of consumptive patients. Six

* I have carefully read through Professor Koch's 'first circumstantial publication,' and found in it no signs of the reserve here mentioned. The impression given to the whole scientific world by that paper was that Koch had proved the identity of the two conditions and disproved the teaching of Virchow and others, who held their non-identity.

other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few gray nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuberculosis had, without exception (just as in the cattle experiment), severe tubercular diseases, especially tubercular infiltration of the greatly enlarged lymphatic glands of the neck and of the mesenteric glands, and also extensive tuberculosis of the lungs and the spleen.

'The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep, and goats, into whose vascular systems the two kinds of tubercle-bacilli were injected.

'Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chauveau, Günther and Harms, Bollinger, and others, who fed calves, swine, and goats with tubercular material, one finds that the animals that were fed with the milk and pieces of the lungs of tubercular cattle always fell ill of tuberculosis, whereas those that received human material with their food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie and Frothingham, and their result agreed with that of ours.* The unambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of infection which excluded all sources of error, and carefully avoided everything connected with the stalling, feeding, and tending of the animals that might have a disturbing effect on the experiments.

'Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however, that these experiments should be repeated elsewhere, in order that all doubts as to the correctness of my assertion may be removed.

'I wish only to add that, owing to the great importance of this matter, the German government has appointed a commission to make further inquiries on the subject.

'But, now, how is it with the susceptibility of man to bovine tuberculosis? This question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the exprimental investigation of it with human beings is out of the question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection-experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing

* As I have pointed out elsewhere (Canadian Journal of Medicine and Surgery, November, 1901), and as others in the United States have noted, Koch here by no means gives to American workers the credit that is their due. In 1893, Gaiser, working under Baumgarten, of Tubingen, had inoculated one cow with human, another with bovine bacilli, and had obtained negative results with the former and rapidly developing miliary tuberculosis with the latter. This, it will be seen, was a single observation, and it attracted little attention. The credit lies with Frothingham, Theobald Smith and Dinwiddie, who, by carefully planned experiments, free from all sources of error, established the fact that cattle are in general immune to pure cultures of tubercle-bacilli derived from man. Koch and Schütz at most confirmed these observations, which, it may be added, appeared before these last observers began their series of studies.

tuercle-bacilli could not but occur among the inhabitants of great cities, especially the children. And most medical men believe that this is actually the case.

'In reality, however, it is not so. That a case of tuberculosis has been caused by alimenta can be assumed with certainty only when the intestine suffers first,—*i.e.*, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great post-mortem material of the Charité-Hospital in Berlin, ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick's Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3,104 post-mortems of tubercular children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated, it is by no means certain that they were due to infection by bovine tuberculosis. It is just as likely that they were caused by the widely propagated bacilli of human tuberculosis, which may have got into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle-bacilli found in the tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite characteristic and convincing results.* For half a year past I have occupied myself with such investigations, but, owing to the rareness of the disease in question, the number of the cases I have been able to investigate is but small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

'Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tubercular cattle, and the butter made of their milk, as hardly greater than that of heriditary transmission, and I therefore do not deem it advisable to take any measures against it."

After these statements, he concludes that the only main source of infection of tuberculosis being the sputum of consumptive patients, the measures for the combatting of tuberculosis must aim at the prevention of the dangers arising from its diffusion. And from this point he proceeds to take up over-crowding, bad hygienic conditions, sanitaria, and so on.

Let me discuss the above statements. It will be seen that they divide themselves into three parts : (1) a study of the transmissibility of human tuberculosis to cattle ; (2) a study of the transmissibility of bovine tuberculosis to man, and (3) the conclusions to be drawn from the facts and inferences set forth. It will be well to consider these in order.

1.—The Transmissibility of Tuberculosis from Man to Cattle.

From what I have stated in my preliminary remarks, and from this additional evidence afforded by Koch and Schütz, it must be accepted that experimental inoculation of pure cultures of tubercle bacilli derived from man (bacilli which are virulent

* This method had been previously recommended by Theobald Smith.

for rabbits and guinea pigs), leads to little or no result in cattle ; the bacilli are practically harmless. It must, however, be clearly recognized that this is not the same as saying that human tuberculosis is never conveyed to cattle for (*i*), as Hueppe points out, different breeds of domestic animals react differently towards various diseases. Most breeds of swine are insusceptible to anthrax, and this led to the statement that this disease cannot be given to them, but more recently some breeds are recorded as being liable to succumb thereto. It is possible that further study will show that certain cattle can be infected with pure cultures of the tubercle bacilli. At most it may be laid down that the results gained by observers in widely separated regions in Europe and America upon the effects of inoculating young cattle (which are more susceptible and less resistant to tuberculosis and infectious diseases in general than are fully grown animals), indicate that the majority of cattle are not liable to be infected by human tubercle bacilli.*

(*ii*) A more important consideration is that we must clearly distinguish between experimental and natural infection. Because under the conditions of the experiments observers have obtained negative results, it does not follow that under all conditions infection cannot be conveyed. As a matter of fact, we realize more and more that the mere presence of virulent bacteria is not sufficient to set up the disease, that an equally important factor is the condition of the system. Thus, in connection with this very matter of tuberculosis in man, we know that while all are exposed to infection, at most 7 per cent die of the disease ; those in good health resist infection ; that this infection is specially liable to occur when the system has been lowered by other infectious disease, so that an attack of tuberculosis is notably liable to be dated from an attack of la grippe, pneumonia, typhoid or other acute infection. So it may well be that natural infection is possible ; indeed, Crookshank's observation, already referred to, proves that this is the case. It will be remembered that injecting under the skin of the calf sputum from cases of phthisis, he introduced also suppurative microbes, and caused abscess formation, and when the animal died found distinct evidence of acute, though not very extensive, tubercular infection. Delépine, of Manchester, during the last few weeks, would appear to have obtained results of a like order. Judging from his preliminary note, he is causing tuberculosis in calves by injecting a mixture of phthisical sputums, containing tubercle bacilli derived from several individuals,—together with other micro-organisms.

Ravenel's observations, communicated also to the British Congress, clearly point to the same conclusion. He found, taking four calves and inoculating them intraperitoneally with 10 ccm. of human tuberculous sputum from different sources, but all containing a large number of tubercle bacilli, that one showed no ill effects, and at the autopsy was found to be entirely free from the disease; the other three all became infected with tuberculosis, the lesions in two being quite extensive. Making an emulsion from the material of well developed tubercular nodules of these last two cases, he inoculated 20 cc. of these emulsions, which were found rich in bacilli, into two other calves. The result was absolutely negative in the one animal, practically so in the other. Ravenel concludes that since both these calves received a much larger number of tubercle bacilli in the emulsion than did those which were inoculated directly with the sputum, the development of the disease in the latter must have been due to a mixed infection which operated to the advantage of the tubercle bacilli. The attempt to infect two calves with human sputum by the digestive tract failed wholly. Herein he confirmed the previous results of Sydney Martin and the earlier French and German observers, and Koch's recent results.

It is generally held that, in experimental inoculations, one overcomes the resistance of the body tissues by introducing microbes in very much greater quantity than ever

* The wholly contradictory results obtained by Koch and Ravenel in connection with the transmission of human tuberculosis to swine is best explained along these lines—*i.e.*, that they employed different breeds.

by any possibility gain entrance in the course of a natural infection. As I have emphasized in previous reports, the number of pathogenic bacteria introduced is one factor in the production of disease. Where a mixed infection is set up the suppurative microbes, growing rapidly, may permit the human tubercle bacilli introduced at the same time to grow with little hindrance until their number is so great as to overcome the resistance of the tissues, and so gain a definite foothold. What is more, it may be that these other microbes in their growth may give the bacilli time to 'accommodate' themselves to the changed conditions of existence, so that gradually they assume properties harmful to the organism of their host. The power we possess of making the tubercle bacilli from birds grow in rabbits, &c. (Nocard, Hueppe and Fischel), affords evidence of this accommodation; Ravenel's observations (University of Pennsylvania Medical Bulletin, Sept., 1901), that 'human' bacilli passed through hogs gains an increased virulence for guinea pigs and rabbits, points in the same direction.

Striving to balance these various factors and possibilities I am inclined to conclude that while human tuberculosis may be conveyed to cattle, circumstances favouring this transmission under natural conditions will be found to occur very rarely, so rarely that, for practical purposes, we may neglect this as a cause of tuberculosis in cattle. Or in other words, it is safe to lay down as a practical rule that tuberculosis developing in cattle is derived from previous cases of the disease in other cattle, or it may be in other herbivorous animals and from these only. From which it follows that measures calculated to lead to the eradication of bovine tuberculosis may be undertaken with a full prospect of success even in districts where human tuberculosis is frequent and is permitted to continue unchecked.

2.—On the Transmissibility of Bovine Tuberculosis to Man.

Under the above heading, as indeed was the case in the previous section, two distinct issues have to be considered ; (*i*), the possibility of transmission, and (*ii*), the relative frequency of such transmission of the disease from the one to the other species. Most writers on the subject, have confused the two, yet a little consideration will show that they are not directly related. It is possible, for example, that while tuberculosis may be transmitted from cattle to man, Professor Koch's conclusion is in the main correct, namely, that it occurs so rarely as to be outside the range of practical politics. Or otherwise, in order to prove the extent to which this transmission is a danger to the community, and to determine the need for special legislation, the demonstration of a definite case or cases of transmission having occurred, is not all that is needed ; it is necessary to show that transmission occurs with sufficient frequency to constitute a menace to the well-being of the community.

Let me be permitted here to anticipate matters and state that I am of an open mind upon this point ; that, on the one hand with Baumgarten and Ribbert and other German authorities who wrote prior to Koch's latest utterance, I believe that the danger has been exaggerated ; that I believe the transmission to be infrequent ; but that, on the other hand, I consider that the transmission has been demonstrated ; that it is more frequent than Koch has indicated ; that in one class of the community, namely, little children, the transmission does occur and this through the use of infected cow's milk; that I hold that even if this be so, a far greater danger from milk, a far more alarming cause of infant mortality are the other contaminations to which milk is liable, so that our first thought should be how to reduce these other contaminations. I am of an open mind as to how far there should be special legislation for the prevention of the use of tuberculous milk over and above legislation, and municipal regulations, tending to insure the freedom of milk from infective properties in general (tuberculous infection included). Having thus briefly indicated my position I will now proceed to state, as impartially as possible, the evidence we possess, for and against, upon these matters, so that the reader may form his own conclusions:

The Transmission of Tuberculosis from Cattle to Man.

It must, in the first place be noted, that Koch nowhere denies in his address, categorically, the possibility that such transmission does occur ; the most he states is that if it exists it is of very rare occurrence. As a matter of fact the occurrence has been absolutely demonstrated. There are several cases on record in which veterinarians and butchers when cutting up the bodies of tuberculous cattle, have wounded and thus infected themselves and subsequently manifested the symptoms of local and generalised tuberculosis. Ravenel, of Philadelphia, brought forward some five cases of this nature at the British Congress. In the Philadelphia Medical Journal of July 21, 1900, he quotes three cases which had come under his immediate observation. Two similar cases are recorded by Tscherning and Pfeiffer, and he gives two other cases in which there might be some doubt.

There are other cases in which it is impossible to reach any other conclusion than that there has been definite infection brought about by drinking the milk of cows suffering from advanced tuberculosis. The most recent collection and critique of these cases is by Professor Repp (American Medicine, October 26, 1901, p. 645, and November 2, p. 688), Professor of Pathology and Veterinarian to the Iowa State College, namely, cases by Olivier, Stang, Demme, Hills, Ernst, Leonhardt, Sontag, Hermsdorf and Rich.*

To summarize, we have cases in which members of a family brought up on the milk of cows found to be tuberculous have died of tuberculosis, while other members, who have not used this milk, have remained healthy ; cases in which several infants at children's hospitals or girls at school have nearly simultaneously shown evidence of intestinal tuberculosis, and the number of cases raising suspicion, the cows affording milk to the institutions have been examined and found to be in an advanced state of tuberculosis ; cases in which children brought up on the milk of one cow have developed the disease and the cow has been later condemned as suffering from advanced tuberculosis. The evidence thus must be regarded as clear and convincing that the transmission is possible.

On the Frequency of such Transmission.

(*a*) *Through Wounds.*—The direct introduction of tuberculous material into the system through gross wounds is in itself a rare event. Beyond demonstrating that bovine tuberculosis can thus be the cause of human infection it is doubtful whether cases of this order have a high value for our present purpose; at most, that is to say, personal care and the full recognition that the disease may be conveyed by this means can be of avail; legislation can be of no effect.

These doubts are increased when it is remembered that we have evidence pointing to the fact that all cases of wound infection with bovine tubercular material do not lead to the development of tubercular disease in man, even when large numbers of tubercle-bacilli are introduced into the system which have been gained from pure cultures. Baumgarten, for example (Berlin, klin. Wochenschrift, September 2, 1901, p. 894), has recorded a case of a physician working in his laboratory at Tubingen who, accepting the view of Rokitansky that tuberculosis and cancer are antagonistic

* Repp also quotes as evidence Thorne's report that 22 physicians out of 339 practising in Ohio replied in the affirmative to the question ' Have you been able to trace any case of tubercular disease to the milk of unhealthy cows ?' and that 33 replied affirmatively to the question ' Have you had reason to suspect the origin of tubercular disease in older children or adults to be in the milk or meat supplied ? ' So few show themselves to have a correct appreciation of what constitutes positive evidence, that these mere affirmative and negative answers of practitioners of Ohio cannot be held to be of any value ; to arrive at a judgment it will be necessary to know the facts of the individual cases. On the other hand it is but right that I should note that, talking over this subject with medical men of various districts, I have heard of unpublished cases (unpublished because one or two links in the evidence appeared to be a little weak), which, however, have left little room for doubt.

diseases, the one never developing when the other is present, inoculated more than half a dozen patients suffering from inoperable malignant tumours, with pure cultures of bovine bacilli. He did not, it is true, cure the patients ; we now know that Rokitansky's statement was incorrect, the two diseases can occur together, and among others Dr. W. F. Hamilton, of this city, has brought together cases of their co-existence. But on the other hand, not one of these patients developed tuberculosis. An abscess formed at the site of inoculation which gradually healed, and when Baumgarten performed the post mortems, he discovered merely scar tissue at the site of inoculation and neither by the naked eye nor under the microscope could he find a single evidence of the development of tuberculosis in any part of the system.

One who is now a well known writer on veterinary subjects, a former pupil of our school, has reminded us that while engaged some years ago in Montreal in removing puriform material from a suspected tuberculosis mass in a cow in order to test its nature by inoculating into a guinea pig, the animal lurched, causing the needle of the filled syringe to penetrate deeply into the ball of the thumb. The guinea pig subsequently inoculated died of virulent tuberculosis ; the deep wound in his thumb muscles healed completely and no ill results ever showed themselves.

These observations must not be taken as contradictory, but rather as being in harmony with what I have already stated to the effect that infection is not purely determined by the presence of bacteria. They, however, may be accepted as clearly indicating that bovine tubercle-bacili are not more virulent for man than are tubercle-bacilli of human origin.

Dr. Ravenel, in his remarkable paper already referred to, read before the British Congress on Tuberculosis, remarks: 'Accepting it as proven that the bovine tubercle-bacillus has, as a rule, considerably greater pathogenic power than the human bacillus for a large majority of experimental animals, how should we interpret this as regards man ? Is it fair to conclude that this increase of virulence will hold good for man also ? Until the contrary is proven, or until good reason for believing the contrary is shown, it is in my judgment right that this conclusion be held at least as a working hypothesis. I am aware of the objections to this view which will be raised by some and acknowledged freely that it cannot be accepted as conclusive.'

The above observations seem to me clearly to afford proof that we are not justified in concluding that because the bovine bacilli are more virulent for guinea pigs and rabbits, they are therefore more virulent for man.

Granting, as I have shown, that under certain conditions and in certain cases bovine tuberculosis is transmissible to man, it is at the same time very remarkable how singularly rare are the cases which afford reasonably sure grounds for being certain that infection has been through the milk. The number of clear cases may be counted upon the fingers of the two hands and this notwithstanding the fact that for seventeen years the identity of human and bovine tuberculosis has been generally accepted. Not one clear case or series of cases by an individual observer, has been published per annum. And this notwithstanding that tuberculosis ranks as our greatest zymotic scourge, and notwithstanding the fact that in some countries from 30 to 50 per cent of all milch cattle give evidence of the disease.

There are, it is true, reasons which possibly explain this state of affairs. First and foremost there is the long incubation period, or long period intervening between the moment of infection and the development of definite symptoms of the disease, this rendering it difficult to determine whether modes of infection other than through milk may not have been the cause. It will readily be understood that when the period of incubation is evidently variable and when two or three months may elapse before the symptoms appear, it is difficult to put one's finger upon a particular spot or period and say it was at that point or time that infection occurred,—especially when human tuberculosis is so generalized and there are so many possibilities that the infection may be traced to this latter source. Nevertheless, I am inclined to believe

that this is not an adequate explanation of the rareness of these cases. It is remarkable that not a single case or series of cases has yet been recorded as occurring, even among children, fed from the milk of one 'milk round.' With typhoid, scarlet fever, and according to some authorities, diphtheria, we recognize local epidemics, sharply marked out, occurring among those and those only who have drunk the milk from a peculiar dealer. This never occurs with tuberculosis. Now, were the bovine tubercle-bacillus specially virulent for man, we ought to meet with such cases. We know that 70 per cent of the cattle, or more, on certain farms may be affected with this disease, that from 2 to 3 per cent of these cattle may be subject to tuberculosis of the udder and in their milk there may be literally millions of the active bacilli.

It is no sound argument to say that a distinction must be made between the tubercle-bacillus and the bacilli of the other diseases mentioned, because these grow rapidly in milk, whereas the tubercle-bacilli grow with peculiar slowness; and again, that the explanation is to be found in the fact that in a milk round the milk of a tuberculosis cow is so diluted with milk containing no bacilli, that at a given meal it contains a number insufficient to set up infection. At most this is but a partial explanation, whereby I mean that such diluted milk is found repeatedly by experiment capable of setting up tuberculosis in cows and even swine, and this to such an extent that in certain districts and states regulations have been framed forbidding swine to be fed with unsterilized skimmed milk from creameries. If thus calves and swine are liable to be infected by such milk and the mode of infection is in them clearly recognizable, why is it that we never find the same occurrence in man ? The only possible explanation can be that the bovine tubercle-bacillus is not of specially high virulence for man, that in general it must be a susceptible individual who drinks milk containing relatively enormous quantities of the bacilli that is liable to be infected. So far, then, as we can justly draw any inference from the reported cases of definite infection from milk, it would seem that Koch rightly calls attention to the fact that 'If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of alimenta containing tubercle-bacilli, could not but occur among the inhabitants of great cities, especially the children, and that in reality this is not the case.'

But when we come to consider other aspects of this subject of infection through the milk we become more doubtful. All, I think, will agree that circumstantial evidence points to the fact that with increasing age individuals become less and less prone to infection with any form of tuberculosis. We have practically no evidence of those over 25 years of age becoming infected by bovine tuberculosis through the food. There remain, however, the children and young adults, and here the evidence is undoubtedly in favour of believing that milk does form a mode of setting up tuberculous infection. In our great cities, for example, upon this continent, tuberculosis in general is about as common as it is among the inhabitants of the great cities of Europe, and yet, as Dr. Northrup pointed out with regard to its appearance in the city of New York, and as Dr. Blackader has noted to me in connection with Montreal, tuberculosis of young children, and especially peritoneal and intestinal tuberculosis, is remarkably rare, whereas it is relatively common in London, Paris and other great European centres. For myself, although I have performed several hundred autopsies here in Montreal during the last nine years, I can recall but one case of primary tuberculosis of the abdominal cavity in a child under ten, and but four other cases in which there were grounds for considering that infection had been through the digestive system. Dr. Wyatt Johnston's much greater experience is in the same direction. Dr. Nicholls recalls one case in which he found a caseous mesenteric gland with no tuberculosis elsewhere, the child dying from another disease. Deaths from tuberculosis in this city average some 935 per annum, but according to the health report of the province for the year ending June, 1900, only three of these are put down as being due to abdominal tuberculosis in children under five, only four in children

under fourteen. It is true that Koch points out the great infrequency of primary tuberculosis of the *intestine* at the Charité and Hospital for Children in Berlin, but I do not here refer to primary tuberculosis of the intestine merely, but to cases in which from the greater involvement of either the intestine or the mesenteric glands, it is reasonable to suppose that infection proceeded from the digestive tract ; for it is well known that in animals fed with tuberculous material there may be no obvious ulceration of the intestines, but definite enlargement and caseation of the mesenteric lymphatic glands which receive their lymph from the intestinal walls. These cases ought not to be left out of account ; nay, more, they are relatively common in European cities. Thus, at the Great Ormond Street Hospital for Children in London, Still found that of 769 autopsies on children under twelve years of age, 269 revealed tuberculous lesions, and in these cases no less than 23·4 per cent showed evidence of primary infection having been from the alimentary canal. Widerhofer, in Germany, found 101 out of 418 cases of tuberculosis in children, in which there was involvement of the intestine (or about the same proportion), and 42 per cent of these cases of intestinal tuberculosis were in children between the ages of two and five years.

This remarkable difference between the extent of primary abdominal tuberculosis in Europe and America would seem to be very possibly related to the relative frequency of bovine tuberculosis in the two areas. In this neighbourhood, for example, advanced bovine tuberculosis is extraordinarily rare, and in general the percentage of bovine diseases in the States is very much lower than it is in Europe. This, however, may possibly not be the only fact we have to take into consideration in explaining the rareness of infantile tuberculosis in America. In Europe this is most common in crowded cities, and the wretched hygienic conditions, the overcrowding, the bad atmosphere, the narrow streets, the back to back houses in the poorer quarters of the large cities, have much to answer for ; the children here, even the poorest classes, are not so poverty-stricken, and are brought up under healthier surroundings. Notwithstanding all this, I think these differences in the statistics of the two areas do point to infected milk being a factor in the frequency of tuberculosis among young children.

Certainly, Dr. Tatham's observations and Sir Richard Thorne-Thorne's impressive summary of the British statistics, cannot be gainsaid. If there has been in Great Britain during the last forty-five years a reduction of 27·9 per cent in the deaths from all forms of tuberculosis, if the reduction in phthisis reached 66 per cent, while the corresponding reduction from Tabes mesenterica only reached 3 per cent, it will be seen, to quote Thorne-Thorne, 'that in considering the latter cause of death, we are dealing with a totally different state of affairs. The matter, too, assumes a still more serious aspect if we limit ourselves to the first year of life, when milk is most largely used as food, for then we find that the reduction in the rate of deaths from the various forms of tuberculosis, which reduction has been going on at all ages for about half a century, not only disappears, but is actually transformed into a large increase, reaching no less than 27·7 per cent. This in itself is grave enough, but its significance is still further emphasized when we remember what are the circumstances under which this increase in the rate of death from Tabes mesenterica has gone on synchronously with the decrease in that of other forms of tuberculosis.'

For myself, I do not see how we are to explain these remarkable figures, save on the supposition that impure and infected milk is an esential factor in the production of abdominal tuberculosis in young children. Not all these cases, it is true, should be regarded as due to milk. The habit of expectoration by adults, the creeping habits of children, their liability to put everything into their mouth, lead to a very great possibility of infection with human tubercle bacilli through the digestive tract. But admitting this, and admitting also the wretched hygienic conditions above-mentioned, admitting even that the hygiene of the house in Great Britain has not improved at the same rate as has the hygiene of the factory and of work places in general (which

improvement is the main cause of the decrease in tuberculosis in adults in Great Britain), if mesenteric tuberculosis were in the main due to infection with human tubercle bacilli, then, with the lessening of tuberculosis in adults, there ought certainly to be a corresponding diminution in the number of cases of Tabes mesenterica in children, and this has not occurred.

The last adverse criticism to be applied to these figures of Thorne-Thorne, and Tatham, is that possibly they are incorrect; not that they have been wrongly drawn up, but that in the earlier portion of the forty-five years tuberculosis in children was entered under some other heading as wasting disease of one or the other order. But tabes mesenterica is a condition which has for long years been commonly diagnosed.

Taking into consideration all these various data I am forced to the conclusion that human beings at the age to which they are most susceptible to disease in general are distinctly susceptible to tuberculosis of bovine origin. Nay, more, I must admit that it is quite possible that cases of scrofulous, that is to say tuberculous lymphatic glands and of tuberculosis of the tonsils, may also be of this origin ; and as the infection may spread from the glands of the neck to the glands of the thorax, that many cases which have apparently originated in connection with the lungs and respiratory tract are truly of alimentary origin.

Yet granting all this, it must only be the more weakly children living under bad hygienic conditions or children peculiarly susceptible who are liable to this mode of infection or those, swallowing enormous numbers of bacilli with their food, otherwise it is difficult to understand why, with bovine tuberculosis so very rife, the majority of the children in certain districts do not die from this form of disease.

Lastly, it is necessary, I think, to call attention to what appears to be a faulty argument on the part of Professor Koch. 'Hitherto,' he states, 'nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin, now we can diagnose them ; all that is necessary is to cultivate in pure culture the tubercle bacilli found in a tubercular material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them.' The reasoning here appears to be not in complete harmony with the facts at our disposal. Were bovine tubercle bacilli very virulent for man, and did they lead to a very rapid development of the disease, then in such cases it is quite possible that growing in the human body, they would retain their original characteristics and would be peculiarly virulent for rabbits and guinea pigs. But frequently, as is well known, cases are of long duration, and where this is so, even if of bovine origin, the bacilli, living and multiplying in the human organism, should gradually become modified, and we should expect them to assume more and more the characters peculiar to human tubercle bacilli. They would be modified by their environment, and it is doubtful whether by this test one could surely determine the origin of the infection in every or even in the majority of cases.

I do not mean here to say that there would be absolute correspondence between the bacilli taken from all cases of tuberculosis. As a matter of fact, and as Lartigau has recently shown (American Journal of Medical Research, N.S., Vol. No. 1, 1901, p. 156), there is a great variation in the virulence of tubercle bacilli derived from different cases of the disease in man. He, indeed, noted one case in which from the slow development, ground glass appearance of the colonies and extreme virulence of the bacilli for guinea pigs and rabbits, he was inclined to believe that he was dealing with bacilli of bovine derivation. I do not say that cases of this nature may not be detected, I only urge that the characters of the bacillus vary according to its host and to the length of the sojourn within the human body, and so the test is liable to be an uncertain one.

3.—Summary.

In endeavouring to record as impartially as is in my power the various data we possess bearing upon this question of the intercommunicability of human and bovine tuberculosis, it may well be that, detailing many facts, some of which upon first reading seem to point in the one direction, others in a direction diametrically opposite, I have left the unfamiliar reader uncertain as to my interpretation of the same, and as it is only right that the reader should expect from me where possible definite conclusions, that he should know what are my opinions, it is fitting that I should sum up the conclusions which I regard as safely to be deduced from our present knowledge of this subject. These conclusions are :

1. Bovine tuberculosis is easily conveyed from cattle to cattle and, whether by inhalation the most common method), by the milk (in calves), by contamination of stalls and drinking water through the agency of the saliva, and nasal discharge, or by intrauterine infection (very rare), this transmission from one animal of the bovine species to another is far and away the commonest mode of infection in cattle, so common that for practical purposes all other modes may be neglected.

2. Human tuberculosis is transmissible to cattle. Pure cultures of the bacilli rarely cause infection. Mixtures of tubercle bacilli with other micro-organisms (as in sputum) appear to be more infectious. The difficulty in inducing artificial tuberculosis favours the idea that natural infection of cattle with human tubercle bacilli must be of singularly rare occurrence.

3. Certain breeds of swine appear to be fairly easily infected with both human and bovine tubercle bacilli, and when infected with the former these gain an increased virulence for guinea pigs and rabbits. But while through the use of infected milk these animals become frequently infected from cattle, conditions favouring the reverse process are rare. Thus while it may occasionally be that swine, or possibly other domestic animals, act as intermediaries in the passage of tuberculosis from human beings to cattle, the conditions favouring such transmission from man to the hog, from the hog to cattle, so rarely show themselves that, again, for practical purposes, this mode of infection may be neglected.

4. If this be so it should be possible to eradicate bovine tuberculosis in a region in which human tuberculosis continues to be widespread.

5. Human tuberculosis in the majority of cases is conveyed from human being to human being by inhalation, more rarely it is conveyed through the alimentary tract, still more rarely through the genital tract, through surface wounds, and, from the mother to the fœtus, during intrauterine life.

6. Everything points to the fact that in the main the bacilli causing infection in man are derived from previous cases of the disease in man.

7. By sojourn in the human body and passage from man to man the human tubercle bacilli have acquired properties differing from those acquired by bacilli which have passed through cattle ; their shape differs, the rate of growth and the appearance of the growths outside the body are different ; their virulence towards the animals of the laboratory is also different.

8. These differences are not, however, sufficiently marked or constant enough, to permit us to conclude that we are dealing with distinct species. On the contrary the evidence at our disposal points clearly to the fact that in the different species of animals we encounter at most races of tubercle bacilli, which by growth in the bodies of animals of another species take on the characteristics of the race of bacilli peculiar to that species.

9. Bovine tuberculosis can be transmitted to man and this either through wounds or through the digestive tract.

10. By passage through cattle the tubercle bacillus gains increased virulence for cattle, rabbits and guinea pigs, but lessened virulence for man and (it would seem also) for carnivorous animals.

11. Save in the very rare cases of wound infection, there is a significant lack of evidence that bovine tubercle bacilli infect adult human beings.

12. It is infants and those of early age who are liable to be infected by the tubercle bacilli of bovine origin, and this through the agency of milk. The statistics bearing upon the continued frequency of tuberculosis in children and upon the relative frequency of intestinal and abdominal tuberculosis in children must be accepted as conclusive evidence upon this point.

13. Even with children a consideration of the great frequency of bovine tuberculosis in certain regions and of the absence of any record of tuberculosis affecting those supplied from a given 'milk-round,' leads to the conclusion that the bovine bacilli have not heightened virulence.

14. The few positive records we possess of direct transmission of tuberculosis from cattle to man through the agency of the milk indicate that infection is brought about only by the employment of milk of cattle which are very extensively diseased, more especially of those suffering from udder disease. Such milk contains enormous numbers of bacilli. In other words, large numbers of tubercle bacilli are required in order to infect human beings with bovine tuberculosis. This again is an indication that the bacilli cannot be regarded as having gained a heightened virulence for man, and that infection is not very readily communicated.

15. Animals showing physical signs of tuberculosis (for mild grades of the disease afford no physical signs), and, above all, those exhibiting udder tuberculosis, should therefore be condemned and under no conditions should their milk be used for food.

16. Where there is tuberculosis in a herd, Bang's method should be employed, the animals reacting to tuberculin being separated from the healthy ones ; the milk from the reacting animals for whatever purpose used, should be pasteurised so as effectively to destroy the tubercle bacilli. (*Vide* previous report.)

17. The great cause of infantile mortality is inflammation of the stomach and intestines (gastro-enteritis and 'diarrhœa'), and this is proved to be mainly brought about by the use of badly kept and fermenting milk. Wholly apart therefore from the question of tuberculosis, it is imperatively necessary that greater care should be exercised by all concerned in the distribution of milk. The general measures taken to lessen this, the greatest scourge of childhood (prohibition of use of milk from cattle showing any form of sickness, pasteurisation of milk, &c.), will equally lessen the danger of the transmission of tuberculosis from cattle to man.

Had this been more fully realised, had the agitation (in England more especially), for municipal and governmental supervision of the milk supply and for the distribution of pure milk been based upon what we know concerning contaminated milk in general and its dangers, rather than, as it was, upon the danger arising from the conveyance of tuberculosis, it is safe to say that Koch's address would not have had nearly the same deleterious effect.

But, acknowledging this, Koch is by no means absolved from blame for the manner in which he published his conclusions. It was his duty to have pointed out that those conclusions did not affect in the slightest the legislative and other measures adapted to reduce the danger to cattle and to the agricultural community resulting from the spread of tuberculosis among cattle and the domestic animals. Not doing this he left it to be inferred that legislation against bovine tuberculosis is in excess of what is necessary. And this, it is right to protest, was little less than criminal on his part. I should be glad to think that the cautious stand I have taken during the last few years since I have had the honour to be pathologist to your department, and my constant endeavour not to exaggerate, in these reports, the dangers of bovine tuberculosis in relation to human beings, have here in Canada lessened this harmful influence of Professor Koch's address.

PICTOU CATTLE DISEASE.

In the summers of the year 1894-95, I was deputed by the Minister of Agriculture to investigate the remarkable localized enzoötic, affecting more especially cattle, occurring in the north of Nova Scotia and extending, roughly, from Pictou on the west to Antigonish on the east, known as 'Pictou Cattle Disease.' The results of my investigation were published with some little detail in the report to the minister for the year 1895. I further communicated a description of my findings to the Pathological Section of the British Medical Association, at its meeting in Montreal, in 1897, of which brief abstracts appeared in the *British Medical Journal* and the *Lancet* of that year. Owing, however, to the loss of certain notes and more especially to the difficulty I found in devising a method for demonstrating in the tissues the bacteria described by me, I have not so far published the whole results of my research, nor have I ever regarded it as being definitely concluded. Add to this that I could not feel that my discoveries adequately explained all the features of this peculiar disease.

The main disturbance in the organs occurring in this disease as shown at post-mortem, is the development of an extreme condition of cirrhosis of the liver ; that is to say, of replacement of large portions of the liver tissue by fibrous connective tissue. My findings led me to observe whether anything similar was to be made out in connection with cirrhosis of the liver in man, and since 1895 I have, when the opportunity occurred, carefully examined into the bacteriology and the microscopical appearances in conection with this latter state.

The results of my observations and those of workers in my laboratories upon the same subject have been published in a series of papers in the *Montreal Medical Journal*, the *British Medical Journal*, the *Lancet*, the *Journal of Experimental Medicine*, the *Journal of Hygiene*, &c. I have been led by these observations to study a much wider field, namely, that of the presence of bacteria in the organs of the body in general, more especially of bacteria derived from the intestines, and as these observations have materially modified my views with regard to the nature of 'Pictou Cattle Disease' it is but right that I should here briefly refer to them and note other observations which have been made more directly in conection with the disease in question.

It will, in the first place, be necessary to say a few words with regard to the leading features of 'Pictou Cattle Disease,' and this more particularly because I learn that the edition of the report to the minister for 1895 is completely exhausted. 'Pictou Cattle Disease' is only found in Canada in a district spreading along the northern coast of the Nova Scotia peninsula, in a tract of country extending about forty miles along that coast and stretching from five to twelve miles inland. In this district it has been noted for some forty years, now at one end of the area, now at the other. Cattle are in the main affected, but cases are on record in which sheep and even horses have shown similar symptoms. The disease would seem to be very chronic. All the cattle upon a farm are not affected simultaneously, but it has been generally found that in the course of three or four years most of the cattle of a given herd will one after the other be affected. It would not seem that the disease spreads directly from animal to animal for there appears to be no special incidence of the cases following upon the long winter sojourn of the animals in the byres. The gradual extension of the disease from farm to farm through any given district, seemed also to some extent to be related to the fact that each farm had at the back a belt of woodland into which the cattle roam during the summer. These belts are badly fenced off from each other, and the animals when seriously diseased are liable to wander off into the woodland and there die in hiding. This, together with the fact that one or two cases are on record in which the disease had broken out in a neighbourhood after the body of a cow affected with the disease, had been washed down one of the streams and stranded upon the farm lands, appeared to give some considerable support to the conclusion that the disease was of

infectious origin. Indeed for a time the government regulations which demanded the destruction of the diseased animal and the burning of the carcass or burying it in quicklime, seemed to have a deterrent effect upon its spread. During the first few years in which these regulations were carried out the number of cases occurring annually sank from 150 to under 30.

Of late years, since 1898, despite these regulations, the disease has become somewhat more frequent so that doubts are naturally being cast upon this theory of the infectious origin of the disease.

With regard to the symptoms, the first to be noted is that the milk acquires a peculiar bitter taste and has a distinctly acrid odour upon boiling ; following upon this, within a few days, the animal becomes dry, is found to be weak and restless, the coat stares, the limbs are dragged, the bowels loose, some swelling of the abdomen is recognizable, the eyes project and are staring, and the conjunctivæ of the eyes have a slightly yellowish tinge. This weakness deepens and in general the animal dies in a condition of complete muscular weakness and exhaustion, but in some few cases the symptoms are more acute and death is preceded by a period of intense excitement, almost maniacal in character, the animal rushing about blindly charging various obstacles ; after a few hours it falls into a condition of exhaustion or paralysis, followed rapidly by death.

During the two years that I conducted this investigation, I made post-mortem examinations upon some thirty animals, the majority of which I killed in the advanced stage of the disease, and I found, as Dr. Osler and Dr. Wyatt Johnston had previously noted, that the main lesion is an extreme condition of cirrhosis, the fibrous tissue not only being along the vessels between the lobules (periportal), but extending in between the individual cells, the organ being enlarged somewhat and having a smooth or, more rarely, a finely granular surface. In addition I noted the abundant production of thin bile ; almost without exception the gall bladder was found very full and the fæces well stained. The lymphatic glands at the root of the liver and the abdominal lymphatic glands were in general large and succulent, and there was a moderate amount of ascites ; the fluid in the abdominal cavity was particularly clear and limpid. With this there was a remarkable condition of gelatinous œdema of the mesenteries and walls of the intestines, so that these were much thickened. A further constant lesion was the presence of numerous follicular ulcers in the fourth or the true stomach. These, save in very acute cases, were found to be in a cicatrized condition, giving strongly the impression that the earliest lesions in the case were gastric and that the disturbance of the abdominal lymphatic system and in the liver were secondary to this. The spleen was large but by no means markedly so. As noted first by Dr. Wyatt Johnston, in the cases killed apparently in the early stages of the disease, the most noticeable features in the liver are the fatty degeneration of the liver cells, together with great congestion of the vessel of the liver.* This stage appears to give place to a rapid destruction of many of the liver cells and replacement of the same by delicate new connective tissue, which still remains very vascular and also contains abundant lymph channels and lymph spaces, for almost without exception abundant thin fluid made its way into a canula or pipette when this was pushed into the liver substance.

Dr. Wyatt Johnston, and I also, by employing the more usual method of trying to obtain cultures of bacteria by means of sterilized platinum needles, gained negative results, but when, instead of making the inoculations upon the spot, I employed a series of sterilized glass pipettes in which I collected relatively large amounts of the juice of the various organs, ascitic fluid, blood, &c., and then, after some hours,

* I have within the last few week's received from Dr. Pethick a liver showing admirably this earlier stage, with great congestion and fatty degeneration, from a cow examined by him at Antigonish.

inoculated this juice upon various media, I was able to constantly, from the lymph of the abdominal glands and from the liver juice, and more rarely from other organs and fluids, to obtain in each case growths of what seemed to be a characteristic micro-organism. These growths in general developed slowly, often not being present until the end of 48 hours at the body temperature, and in each case they showed themselves to be a small polymorphous organism at times appearing as a diplococcus, at other times as a stumpy bacillus or diplobacillus. This by its polymorphous character gave me a considerable amount of trouble until I noted that in the earlier stages of growth the diplococcus form was the more frequent, later giving place to a more bacillary form. The constancy with which I found this organism in the liver and in the abdominal lymphatic glands seemed in itself at that time to indicate very clearly that this bore some relationship to the disease, more especially when, as was most frequent, I obtained this organism from the bodies of animals which I had myself killed and examined immediately after death, in which, therefore, there was no time for post-mortem entrance of the micro-organism.

This microbe proved itself to be pathogenic for rabbits, guinea pigs and mice, the rabbits dying in some 15 to 20 days, and the guinea pigs in from 30 to 35 days, as a general rule. As I pointed out in my previous report, I was, however, unable in these inoculations to produce a condition of cirrhosis in the animals inoculated with a pure culture, and to this extent the organism did not fulfil Koch's postulates, and it was left open whether this truly had been the cause of the disease. I should add further that upon examining the sections of the liver which had been stained by particular methods, I was eventually able to recognize similar little diplococcoid bodies in abundance in the liver cells and in great abundance also in the abdominal lymphatic glands, and in the liver these were mainly within the cells. When I inoculated rabbits with the pure cultures I obtained the same intracellular appearance of minute diplococci.

From these observations it would seem clear that the development of the Pictou cattle disease is but slow and that there is extensive involvement of the liver before any of the symptoms show themselves. Our experience with the development of fibrous connective tissue in man indicates that this is a matter of weeks rather than of days.

Shortly after my return from Pictou, the first case of human cirrhosis which came to post-mortem presented a condition which resembled greatly that seen in the Pictou Cattle Disease. The fibroid change in the liver, it is true, was further advanced and the liver was small and hobnailed in appearance, but there was the same enlargement of the mesenteric and retroperitoneal lymph glands and of those at the hilus of the liver, and the same curious gelatinous œdema of the mesenteries and walls of the intestine, a change which had not previously been described in connection with this condition in man, although since then I have frequently found it present. This has led me during the last few years to study the bacteriology of human cirrhosis.

More than one form of human cirrhosis is recognized. The so-called hypertrophic biliary cirrhosis of Hanot has for long been regarded by Hanot and the French school in general as of infective origin, brought about by the inflammation of the bile ducts. But this is rare ; by far the most common form is the atrophic or portal cirrhosis, in which the new fibrous tissue is laid down primarily, it would seem, along the sheaths of the branches of the portal vein within the organ. This form most commonly occurs in those giving an alcoholic history, so that alcohol has for long been regarded as the main cause, indeed the condition has been known as the 'gin-drinker's liver.' But now those who have studied the subject are practically agreed that while alcohol may be and probably is an exciting cause, it is not the essential cause. Many cases are on record in which no alcohol has been taken and, again, feeding animals with alcohol in the great majority of cases leads to no cirrhosis,

while thirdly, a systematic examination of the livers of confirmed drunkards, shows that cirrhosis is the exception rather than the rule ; the fatty liver is the common alcoholic condition.

On the other hand, there are definite indications of infective or bacillary disturbances in connection with cirrhosis. The ascites which is so common in this condition is often not pure, but shows evidence of a combined inflammatory disturbance with the development of adhesions and very frequently evidences of inflammation around the liver with adhesions to the diaphragm, while in quite a large proportion of cases we obtain a history of a right sided pleurisy which points to an extension of the inflammation through the diaphragm to the overlying pleura.

In this very first case, above mentioned, studied by me, I obtained evidences of bacteria similar to those of Pictou Cattle Disease, but owing to the fewness of cases presenting, to the great difficulty of staining sections aright, and, I must add, to my own failure to recognize the true relationships of the forms I isolated, it was not until 1898 that I published upon the subject, first in the *Montreal Medical Journal*, in July of that year, and next in a paper read for me by Professior Osler at the Edinburgh meeting of the British Medical Association (The Lancet, Aug. 13, 1898, p. 376) announcing the existence of a mocro-organism in associations with progressive portal cirrhosis similar to that found by me in connection with Pictou cattle disease. This organism I obtained from the liver juice, the ascitic fluid, the lymph from the mesentery, heart blood, kidney and mesenteric glands.

The colonies at first were very minute and the organism, with its pronounced polymorphism and tendency to change from the diplococcoid to the stumpy bacillary form, closely resembled that seen in the Pictou Cattle Disease. Examining a series of sections of twenty cirrhotic livers, I found these present in the liver cells as minute diplococcus-like bodies, surrounded by a faint halo, so small as best to be studied under a very high power of the microscope, namely, under 1-18th or 1-20th immersion lens. Here the 'diplococcoids' in general had a brown stain. But, as I pointed out in the paper contributed to the *British Medical Journal* (October 22, 1898), further studies threw a very considerable light upon this remarkable form. They showed conclusively that both the form obtained from the Pictou cattle disease (as, indeed, had been suggested by Professor Boyce in the discussion upon my paper in Montreal, 1897) and that from the human livers, were at most varieties of the colon bacillus, of the organism, that is to say, which is the common inhabitant of the lower intestinal tract in man and the majority of the warm-blooded animals. They were obviously attenuated and grew more slowly than the typical colon bacillus, they did not cause the same rapid turbidity of broth, while culture outside the body rendered them more active in their growth until eventually they closely corresponded in size and in most of their properties with the group of colon bacilli. Their effects when inoculated into rabbits and guinea pigs, resembled also those seen in connection with the colon bacillus.

I may here add that Dr. Charlton, now Fellow in Pathology at McGill University, has within the last year studied the organism of Pictou cattle disease, which we have kept growing for some years in our laboratory, and finds that it corresponds in all particulars with a form of colon bacillus ('Bacillus D') described by Dr. W. W. Ford, in his study of the varieties of colon bacilli isolated from man (*Montreal Medical Journal*, November, 1900.) This form was isolated by Dr. Ford from the spleen of a case of typhoid in man. This, or the Pictou Cattle Disease organism, has, briefly, the following characters : It is a stumpy bacillus, having a diameter less than 1 μ, motile, having lateral flagella, forming no scum when grown on broth, and causing slight turbidity of that medium. Growths upon agar are smooth and glistening, not very abundant ; growth upon potato visible and luxuriant (in the early stages the growth upon this medium was but slight); it grows in the closed end of Smith's fermentation tube and best at the body temperature ; it can grow in the absence

of free oxygen ; causes no liquefaction of either gelatin, casein or blood serum ; it produces gas when grown in dextrose and lactose broth, but not with saccharose (originally it did not ferment either dextrose or glucose); there is no production of nitrites, but indol is present (originally no indol was present); milk is turned acid and eventually coagulated, and there is a slight fæcal odour; no production of pigment upon agar and no fluorescence (originally many of the cultures obtained direct from the cattle showed a distinct tendency towards the production of a slight yellow colour). It grows best in media which are faintly acid, and is non-pathogenic for mice (the early cultures showed themselves distinctly pathogenic for mice, and this I regarded as one of the indications that I was not dealing with the colon bacillus).

It is interesting to note that parallel with this, Dr. Charlton studied the colon bacillus obtained from the stomach of a case of pernicious anæmia in man, and this gave identical reactions.

It is thus clear, on the one hand, that the organism of the Pictou Cattle Disease is one of a very large group of colon bacilli, and this alone throws some little doubt upon whether it should be regarded as the specific micro-organism of that disease ; because, while colon bacilli have pathogenic properties, and in fact set up many forms of disease in man, the morbid conditions induced by them are all more generalized and not so specialized a type as that possessed by this disease. But from another point of view, if we are not to regard this as the specific organism of the disease, we are, I think, bound to regard it as playing some part in the development. For, on the one hand, as pointed out by Dr. Wyatt Johnston and Mr. E. W. Hammond, the blood of cattle affected with this disease agglutinates the micro-organism isolated from their livers, and this agglutination test is in general regarded as an indication of such relationship between microbe and disease ; and, secondly, these micro-organisms are present in such abundance in the liver and mesenteric lymphatic glands, and that so, constantly that they cannot be regarded as meaningless.

As pointed out in my paper of October 22, 1899, yet further study showed me that in a great number of livers having no symptoms of cirrhosis, similar minute diplococcoid forms are to be recognized in the cells (although not in such great numbers), while, again, as I pointed out at full length in a paper upon the diplococcoid form of the colon bacillus (Adami, Abbott and Nicholson, Transactions of the Association of American Physicians, 1899, and Journal of Experimental Medicine, 1899, vol. 3), by inoculating pure cultures of typical colon bacilli into the veins of a rabbit, after a few hours one gets similar appearances.

These observations led me further to study the bacteriology of apparently normal healthy organs, and as I pointed out in my address to the Society of Internal Medicine at Chicago, in December, 1899 (Journal American Medical Association, Dec., 1899), we are bound to conclude that under ordinary conditions there is a constant passage bers), while, again, as I pointed out at full length in a paper upon the diplococcoid forms staining badly, and often having a brownish tinge, present in the abdominal lymphatic glands and in the liver, are an indication of the constant destruction of these bacteria in these organs. Since then the very remarkable paper of Dr. Ford, late Fellow in Pathology, McGill University (Transactions of the Association of American Physicians, vol. xv., 1900, p. 389, and Journal of Hygiene, vol. 1, 1901, p. 277), has carried on these researches further, and has shown that in at least 80 per cent of the livers and kidneys of healthy normal animals, bacteria are to be obtained which are capable of development, provided the proper culture media be adopted, and provided that these organs be cultivated for a sufficiently long time after their removal from the animals used.

How now do these observations bear upon Pictou Cattle Disease and upon ordinary portal cirrhosis in man ? As I pointed out in my paper in the *British Medical Journal*, of October, 1898 'It may be argued that inasmuch as such forms are con-

stantly to be found in the liver, it is clear that the bacillus can have no power to induce excessive active tissue formation, or otherwise, every living being should suffer from cirrhosis. But there is this to be noticed, that in the ordinary liver in which cirrhosis is absent, the forms visible are almost all corpses and even long action of strong carbolised fuchsin will not lead them to become stained. In cirrhosis on the other hand, while there are many of these non-staining forms, areas can be made out in which diplococcus-like bodies stain deeply. Either they have only recently entered the organ and are just killed, or they are still alive though in a form so attenuated that it is only with difficulty that cultures can be grown from the organ. I still cannot but consider that the very great number of these forms found in well-marked advancing cases of cirrosis is ample evidence that there is a direct relation between them and the process. So also in those advancing cases of cirrhosis my observations show me that the mesenteric glands are crowded with the diplococcus form of the bacillus, just as I found them crowded in cases of Pictou Cattle Disease.'

That certain forms of the colon bacillus under certain conditions are able to bring about cirrhotic changes, has been shown by Dr. Weaver of Chicago (Philadelphia *Medical Journal*, February 4, 1899). He obtained the colon bacillus which he worked with from the body of a female guinea pig. Guinea pigs inoculated with a small amount of the culture, if they did not die within twenty hours, lived from eight to twenty days, and in these animals dying at later periods there was an extensive and early cirrhosis of the liver. Unfortunately after a short period these bacteria lost their virulence so that further transferrence of cultures and study of the development of cirrhosis could not be made.

These observations, so far as they go, are in favour of believing that the organisms of the colon group, play a definite part in the production of cirrhosis.

I further suggested (in the paper just referred to) that in ordinary human cirrhosis we have almost always a history of subacute enteritis or gastro-enteritis, set up apparently by alcohol or some other irritant, and that this inflammation of the bowel by leading to the greater passage out of leucocytes and passage back of these leucocytes containing bacteria, sets up a condition of increased invasion of the organism, more especially by the colon bacillus, the normal inhabitant of the intestine, and I referred to Ramond's observations (*La Presse Medicale*, April 21, 1897), in which he obtained cirrhosis by giving animals by the mouth alternating doses of alcohol and bacterial toxines.

Now, it is interesting to note that a constant lesion in Pictou Cattle Disease is the evidence of ulceration of the 4th stomach. Here it seems to me is the indication of a similar primary gastritis or gastro-enteritis. According to this theory therefore, the colon bacillus or modified form of the same, which I have detected in these cases, is not necessarily the prime cause of the disease, but there is a preliminary and primary inflammation of the intestinal tract. This may be brought about by the colon bacillus but is more likely to be induced by some other cause, either bacterial or toxic, and it still remains to be discovered what is this primary cause.

During this last summer on his return to New Zealand, Mr. J. A. Gilruth, Chief Veterinary Officer and Bacteriologist to the Agricultural Department of New Zealand, in passing through Montreal, called upon me and brought to my attention the fact that in New Zealand they have encountered a very similar disease affecting horses and cattle. Since then he has been good enough to forward to me the reports of his department dealing with this subject. I may here give an epitome of his observations (5th report of the Department of Agriculture of New Zealand, 1897, p. 35) :

The disease appeared in the Winton district, in Southland, fourteen years previously, and has not been observed in any other part of the colony. While there has been considerable loss of horses it showed little or no tendency to spread from farm to farm. No particular age or breed was found more susceptible, although the affected animals were mostly aged ; the season appeared to be without influence though possi-

bly spring and autumn were the periods during which the majority of cases were found. Cases observed by Mr. Gilruth showed jaundiced appearance of the mucous membrane of the mouth, eyes and nostrils; want of co-ordination of the muscles of the limbs, with staggering gait; staring condition of the pupils; constipation and general drowsiness. At times the animals would walk straight through an obstruction. In all cases the liver was more or less involved and apparently cirrhotic. Judging from his description the course of the disease is of longer duration that is that of Pictou Cattle Disease.

On microscopical examination the liver showed a variety of conditions, but in the early stage the capsule was normal, the tissue of the gland soft ; vessels greatly distended with blood, and atrophy of the liver cells; thrombi were often encountered in the hepatic veins and a certain amount of pigment was present in the organ. In the later stages the liver is smaller and harder than normal, presenting in one case all the naked eye appearances of the cirrhotic or hobnailed liver. Mr. Gilruth noted also, which was not observed in cattle, namely, appearances of abundant liver cells within the vessels of the liver and other regions.

It is worth while noting that he found that one-half grain dose of strychnine given in powders, one daily, appeared to have a distinct effect in arresting the course of the disease while purgatives aggravated the symptoms. In this report Mr. Gilruth calls attention to the constipation, and suggests that owing to the want of tone of the intestinal walls, the retained food, fermenting, leads to the abundant production of toxic substances which being, in their turn, absorbed, cause the symptoms of intoxication, &c.

In his report for 1898-99, are given illustrations showing the close resemblance of the liver disturbance to those seen in our Pictou Cattle Disease. In this second report Mr. Gilruth modifies his opinion that the intense congestion was the primary condition in the liver, and regards this as secondary to the cirrhotic change.

In this report he gives a case of a farmer who had lost several cows under peculiar conditions with similar symptoms in each case. This also occurred in Southland where the Ragwort is very prevalent, and to this the owner attributed the disease. I infer from a paragraph in the report for 1898, p. 41, that the Ragwort (Senecio Jacobœa) had also been regarded in the district as the cause of the Winton Horse Disease, and that this weed is common in other parts of Southland, New Zealand, without causing any disturbence, hence he denies its relationship. The conditions here were similar to those seen in our cases. Micro-photographs given of a section of the liver might have been taken also from a case of Pictou Cattle Disease. On this farm mentioned, the government biologist, Mr. T. W. Kirk, had the previous year reported the existence of no poisonous or even harmful plant, but Mr. Gilruth found that in addition to the Senicio Jacobœa to which apparently he attached no importance, the cows had been in a native bush close to the paddock, and that they were all in the habit of stripping the leaves from the trees which were being felled there.

It is, to say the least, interesting that in Nova Scotia the popular view has been to attribute Pictou Cattle Disease to the existence of the Ragwort. For myself, I continue to be most doubtful as to whether any such relationship exists, although, believing in the existence of some primary cause, not necessarily microbic, I should be glad to find that the irritation caused by the Ragwort was of this nature. Nevertheless, the negative results of the experiments conducted under this department years ago by Dr. Wm. McEachran (when animals were fed for long periods upon dried ragwort), would seem strongly to negative this supposition.

My conclusions may be summed up thus : While it is possible that, as suggested by Dr. Weaver's observations, cirrhosis of the liver may be directly caused by one or other of the colon bacillus group, I am inclined to favour the opinion that there is a primary inflammation of certain portions of the alimentary tract set up by some other irritant, and that it is this primary inflammation which favours the extensive invasion of the blood and lymphatic vessels of the abdominal area, by bacteria mainly belong-

ing to the croup of colon bacilli, which bacilli, by their direct presence in the lymphatic glands and in the liver and by their toxines, set up those cellular disturbances which result in the production of the peculiar anatomical changes found in the Pictou Cattle Disease and in progressive portal cirrhosis in man.

I have the honour to be, sir,

Your obedient servant,

J. GEORGE ADAMI,

The Honourable
The Minister of Agriculture,
Ottawa.

No. 16.

REPORT OF THE ASSISTANT PATHOLOGIST.

(Charles H. Higgins, B.S., D.V.S.)

Montreal, October 31, 1901.

Sir,—I have the honour to submit this my report upon the investigations carried on at the Outremont Experiment Station, from November 1, 1899, to October 31, 1901.

These investigations were seriously interfered with, owing to my transference to the Pacific Quarantine Station at William Head, in March, 1900, for the purpose of establishing at that point, a bacteriological laboratory for the manufacture of Haffkine's prophylactic preventive to bubonic plague, which disease at that time threatened the Pacific coast.* My duties at this station covered a period of nine months, seriously interfering with the work I had in hand before leaving for the west.

However, in spite of the difficulties against which it has been necessary to conduct this work, some of our experiments have been fruitful, while others had to be given up incompleted owing to my absence.

STERILITY OF TUBERCULIN.

In view of the fact that statements were made by opponents of tuberculin testing, that tuberculin contained living germs of tuberculosis and was liable to produce tuberculosis in the animals upon which it was used, a request was made that I inoculate sufficient guinea pigs with the product received from the following laboratories :—Koch's, as used by the department ; United States Bureau of Animal Industry ; Parke Davis and Company, and that prepared by Mr. Ross, of Guelph, Ontario.

With each of these four samples three guinea pigs were inoculated. The day previous to the inoculation their temperature was taken at intervals of two hours, to determine the normal, they receiving the tuberculin in the evening. The day following the temperatures were also taken every two hours to determine whether or not the animals which were being used were diseased to commence with. In no case

* A special report of the work at this station appears in connection with Dr. Montizambert's report in the appendix to the report of the Minister of Agriculture for the year 1900.

was there a reaction ; but in every instance where the same tuberculin was used upon animals known to be diseased a definite and characteristic reaction resulted.

The guinea pigs were weighed daily, the increase in weight being similar to the increase noted in other animals of the same age and under similar conditions, excepting that these latter received no tuberculin.

The amount of tuberculin used was as nearly identical as it was possible to obtain in every case. It was diluted with sterile water and one five-hundredth part of the cattle dose used.

The animals were retained for a period of six weeks, at which time they were chloroformed, careful autopsies being made. The liver and lungs of each animal were examined and in no instance was there evidence of tubercular lesions.

The results of this series of experiments gives conclusive evidence of the non-infectiousness of the samples of tuberculin received for experimentation.

One who is at all familar with the manner of preparation of this product, would not question the sterility of the 'regular' tuberculin as used for diagnostic purposes on cattle, as the heat to which it is subjected is sufficient to kill any living germ of tuberculosis.

CELLOIDIN CAPSULES.*

In the experimentation with these capsules the aim was to determine what changes, if any, cultures of human tuberculosis would undergo, provided they were inserted beneath the skin or in the various body cavities of the lower animals. With these capsules in the living animal conditions are obtained which cannot be reproduced under artificial conditions, namely, that of subjecting the experimental material to the action of the body fluids which pass through the celloidin of the capsule, together with the constant body temperature.

A culture of the bacilli of human tuberculosis was used in each case. Capsules were inserted in pigeons, fowls, rabbits, a heifer and a dog. These insertions were made just prior to my transferrence to the quarantine station in British Columbia, and during my absence the pigeons died from natural causes. When removed from the other animals, the capsules had remained in these artificial containers for a period of very nearly a year. Those in the fowls revealed nothing, the whole of the infection having died out. The one in the dog revealed no evidence of tubercular matter when examined microscopically. The two capsules from the rabbits revealed nothing of particular interest. Polymorphous forms were present, retaining the dye when stained by the Ziehl-Neilsen method. Sub-cultures made direct from the capsules failed to grow. No animal inoculations were made from this series of capsules.

The heifer used in these capsule experiments presented an interesting autopsy, for at the time of insertion of the capsule, one was broken in the process and a slight tuberculosis established in the vicinity. The capsule finally inserted was allowed to fall into the peritoneal cavity as was the original intention. Very briefly, the atoupsy on this animal, which was killed on March 4, 1901, a year from the time of insertion is as follows : The capsule was firmly imbedded in the connective tissue beneath the peritoneum in the right flank. A few small tubercules were present, in all probability caused by the breaking of a capsule at the time of insertion. There were but seven of these tubercles noted and none was larger than a pea.

In this capsule polymorphous forms were detected which stained with fuchsin, and, like tubercle bacilli, were not decolourized by the ordinary methods used in tubercle staining. I was unable to get growths, although all media generally used were tried under varying conditions, together with many forms of special brain media,

* *Vide* McCrae Journal of Experimental Medecine, Oct., 1901.

which have proven more successful in the growth of tubercle bacilli than those ordinarily used. Three guinea pigs were inoculated from the celloidin capsule subcutaneously in the flank region. None of the three developed tuberculosis, indicating that the infection had died out during the prolonged stay of the capsules in the bovine system.

It is desirable to conduct other experiments along these lines, for it seems that if they were properly conducted, definite facts could be obtained, which would determine the relationship between germs of human and bovine origin.

IMMUNITY TO TUBERCULIN BY REPEATED TESTS.

These experiments extend over a period of two years, and they are very interesting, as they are repeated tests upon two tuberculous animals which were at the station in June, 1899. The accompanying table, in which is to be found a record of the various tests and their reactions or failures to react, give one a good idea of the uncertainty of repeated testing, whether it be within a very short or longer period.

By looking over the tests of Cow I., it will be seen that in her reactions there was a marked uncertainty, and that on a test held after some months we were not certain of a definite reaction, while one held almost immediately in the case of Cow V. did give a reaction.

Tests 3 and 4 were the result of an endeavour to produce a localized artificial tuberculosis in the udder that we might obtain infected milk. In the case of Cow I., which was inoculated with a preparation of bovine origin, we were successful in getting germs in the milk, and establishing at the point of inoculation an extensive localized infection, as will be seen by reference to the record of the autopsy on this animal. With Cow V., the experiment was conducted with germs of human origin, having apparently no effect save that of a tuberculin reaction, due to the toxine injected with the bacilli.

An unexplainable fact is that these animals had reacted to tests, one on October 30, 1900, and another on January 3, 1901, but failed to react on April 16, after an interval of three months from the last test. The tuberculin used in this last test was prepared by myself, and did give a reaction in the case of two heifers used for cohabitation, on the same date, which on post-mortem were found to have definite foci of tubercular infection. These facts indicate that the tuberculin was not at fault.

I will not further dilate upon these experiments with tuberculin, for the chart is self-explanatory.

The record of these animals is as follows :—

Cow No. I.—A grade animal, about eleven years old. In good condition, not giving milk, having been dry for about three months. On arrival at Outremont she reacted to tuberculin. She was inoculated on August 3, 1899, with three cubic centimetres of a preparation of pure bovine tubercle bacilli. The inoculation was made into the udder, giving on the day following a definite tuberculin reaction (test 3 on chart). This reaction was obviously due to the tuberculin (*i.e.*, the products of growth of the tubercle bacilli) contained in the preparation together with the bacilli. Guinea pigs inoculated with this culture died in fourteen and fifteen days respectively. A tumour-like mass formed at the point of inoculation which fluctuated considerably in size from time to time.

Autopsy held April 17, 1901.—The superficial glands of the flank and shoulder were free from evidence of disease. The post pharyngeal glands revealed no lesions. The anterior mediastinal glands were slightly affected, containing a very few small tubercles. The brachial glands were slightly affected. Lungs free from evidence of disease.

Liver presented a few small tubercles.

Spleen and kidney free from lesions.

Some few of the mesenteric glands were found slightly affected.

There was evidence of the progress of the disease being arrested temporarily and new tubercles forming, but in no instance was there calcification of the tubercular masses. In the lymph glands especially was this arrested process noted.

The udder was extensively diseased, together with the lymph glands at its base, although one of these lymph glands showed no lesions. The localization of the disease in the immediate vicinity of the site of inoculation is very interesting. The lesions consisted of large tubercular abscesses filled with creamy pus. The milk of this animal after the inoculation in the udder presented tubercle bacilli continually, and this milk produced tuberculosis in guinea pigs inoculated with it.

Cow No. V.—Grade cow, about eight years old, in goood condition, but reacting to tuberculin. She was inoculated into the udder on September 26, 1899, with a pure culture of *human* tubercle baccilli, which preparation killed guinea pigs in eighteen and twenty-three days respectively. After the inoculation there was a definite tuberculin reaction (test four on the chart).

On June 24, 1899, two heifers were placed one on either side of the animal, each being found infected after a period of 107 days and revealing lesions of tuberculosis on post-mortem. On March 15, 1900, a second pair were placed one on either side. Of this pair one reacted to tuberculin in nine months and the other in thirteen months.

Autopsy April 17, 1901.—The superficial glands of the flank and shoulder were free from evidence of tuberculosis. The post pharyngeal glands were healthy. The mediastinal glands were affected in but one instance and this was a small tubercle about the size of a pea. The brachial glands contained a few small tubercles. Spleen free from evidence of disease. The liver presented a few small tubercles of recent origin. Kidney free from lesions. The mesenteric glands were affected in a few instances.

Lungs.—The right lung was found to be diseased as diagnosed in June, 1899, and contained a few tubercles about the size of a hen's egg, which did not seem to be in an active stage. In portions adjacent were to be seen some very small miliary tubercles but these were not extensive. The lesions did not seem in any way to communicate with the bronchial tubes as they must have done when heifers placed with her contracted the disease.

Wherever lesions of old standing occurred it appeared that, while they had not undergone calcification and true encysting, they had been rendered inactive, the contents being different in character from that seen in active suppurating lesions. This would seem to be borne out by the fact that for quite a period the animal failed to respond to tests, while a slight rise in temperature was obtained January 3rd, 1901.

In the udder no lesions were detected after a careful microscopic search, *i.e.*, the inoculation of human tubercle bacilli had led to no results.

TUBERCULIN TESTS. TABLE I.

Number.	Designation of Animal.	Date of Test.	Time of Injection.	Temperature before injection.	Temperature after Injection.										Reaction in Degrees.	Remarks.
					6 a.m.	8 a.m.	9 a.m.	10 a.m.	Noon.	2 p.m.	3 p.m.	4 p.m.	6 p.m.	8 p.m.		
1	Cow I	June 20-21, '99	6 p.m.	102	102	...	104	....	104	.. ...	104	.....	103·4	102·6	2·0	
2	" V	" 20-21, '99	6 p.m.	101·6	102·4	....	104	...	104	.....	104·8	.....	103·8	103	3·2	
3	" I	Aug. 3, 1899.	4.30 p.m.	101·2	.. ...	.....	... ..	.....	106·6	.... .	104	....	103·4	102·4	5·4	Inoculated with pure culture of bovine preparation.
4	" V	Sept. 26, 1899.	5.30 p.m.	102	102·4	101·3	.....	105	106	105·3	.....	105·3	105·3	.....	4	Inoculated with pure culture of human tuberculosis preparation.
5	" I	Jan. 11, 1900.	6 p.m.	101·1	106·1	105·2	.....	105·2	103	102	.....	102	101·3	.....	5	
6	" V	" 11, 1900.	6 p.m.	100·1	104·3	105·1	.....	106	105	105	.....	103·1	102·3	... ...	5·4	
7	" I	" 16, 1900.	6 p.m.	101	101 1	101·3	.....	101·3	101 3	101·2	. .	101	101	.....	....	Double dose used.
8	" V	" 16, 1900.	6 p.m.	101·1	102·2	102·2	...	102	102·1	103	.....	102	101·4	... ..	1·4	" "
9	" I	April 17, 1900.	6 p.m.	101	102	102	.....	102	102·4	103	.....	102·3	102·1	.....	2	
10	" V	" 17, 1900.	6 p.m.	100·3	102·4	103·1	.....	103·1	104·3	104	... ..	103·1	102	.....	4	
11	" I	" 20, 1900.	6 p.m.	102	101·2	101·4	.....	101·4	101·1	102·3	.....	102	102·3	.....	....	Double dose used.
12	" V	" 20, 1900.	6 p.m.	101·3	102·3	102	.....	101·3	102	102	... .	102	101·1	...	....	" "
13	" I	June 1, 1900.	6 p.m.	101·1	102	102·1	....	101·4	101·4	102	.... .	102	101·1	.....	..	
14	" V	" 1, 1900.	6 p.m.	101·3	101·4	102	.....	101·3	101·3	102	.....	101·3	101·1	.....	....	
15	" I	Oct. 30, 1900.	6 p.m.	101	103·2	103	... ..	103·2	104 3	104	.....	103·1	103	....	3·3	
16	" V	" 30, 1900.	6 p.m.	101·2	101	101·1	.....	101·1	103	102·4	.....	103	102·1	.....	1·3	
17	" I	Jan. 3, 1901.	6 p.m.	101	104·1	104	....	102·1	102	102	.....	102	101	.....	3·1	
18	" V	" 3, 1901.	6 p.m.	101	104	104	.. ...	102·4	102·3	102·3	.....	102·2	101	.....	3	
19	" I	April 16, 1901.	6 p.m.	102	101·2	101·1	....	101	101	.....	....	....	. ....	.....	...	Special tuberculin.
20	" V	" 16, 1901.	6 p.m.	101·2	102	102	.	101·2	101·1	.....	.....	...	.....	..	....	" "
21	Heifer 6	June 1, 1900.	6 p.m.	101·1	102	102·1	.. ...	101·4	101·4	102	. ....	102	101·1	. ....	....	
22	" 6	Jan. 3, 1901.	6 p.m.	101·2	103.3	103·1	.....	103·1	102·4	102	.....	101	101·1	.....	2·1	
23	" 21	" 3, 1901.	6 p.m.	102	101 3	102	.....	102·4	102	101·3	.....	102·4	101·3	.....	....	
24	" 6	April 16, 1901.	6 p.m.	102	105	105	.. ..	104·1	105·1	103·4	.....	103·4	.....	....	3·1	Special tuberculin.
25	" 21	" 16, 1901.	6 p.m.	102	104	105·1	....	103·4	103·3	102·3	.....	102·3	.....	.....	3·1	" "

Tests 9 to 16 and 21 were made through the kindness of Dr. Moore during my absence.

COHABITATION.

The cohabitation experiments in a previous report gave definite results with cow V., and it was desired to repeat them, using the same animal to supply the infective material. The two heifers, subjects for this experiment, were placed one on either side of this cow on March 15, 1900, and remained for a considerable period before becoming diseased, as will be seen by referring to the chart of the tuberculin tests. The fact that the animal with which these two heifers were cohabited was the subject of repeated testing, and that at the autopsy evidence was found indicating the arresting of the disease for periods as shown by the lesions, would lead one to the conclusion that the animal was not constantly infective. The non-infectiveness of this animal is further borne out by the length of time taken in infecting the heifers. It must be remembered, however, that the conditions under which the animals were kept were excellent, there being at all times plenty of fresh air and sunlight in the stall within which they were confined. These sanitary arrangements were almost ideal, rendering infection much more difficult than would be the case in a poorly lighted and ill ventilated stable, hence the danger of allowing an infected animal to remain with those known to be healthy becomes very evident.

At the autopsy in each heifer, the lesions were very slight. In the case of heifer 6, which was placed on the right side of the cow, the post pharyngeal glands, together with those of the mediastinum were slightly affected.

In the case of heifer 21, on the left side of the experimental cow, small caseating abscesses were present in the post-pharyngeal glands, other organs and glands being normal.

CULTURE MEDIA.

Since my return my attention has been directed particularly to the study of brain media for the growth of tuberculosis. The results, so far, have been promising, and will be reported at a later date.

TYPHOID BACILLI.

Their Detection in a Sample of Water taken from the Tanks of the ss. 'Montezuma.'

On February 8, 1900, I received from Dr. Montizambert, Director General of Public Health, a sample of water taken from the tanks of the ss. *Montezuma,* on which vessel a number of cases of typhoid had occurred, with the request that it be determined whether or not bacilli of this disease were present.

In pursuing the investigations upon this water, the methods more commonly known, namely, those of Hiss and Capaldi, were tried a number of times without success. Growths were obtained, but a positive diagnosis was not obtained following the methods of these workers.

Fortunately a new method, or rather the modification of an old method by Hankin*, came to hand, resulting in the isolation of the bacillus typhosus.

This method of Hankin is very simple, consisting of the inoculation of a series of tubes containing ten cubic centimetres of broth, to which Parietti's solution has been added in successive amounts, one, two, three, &c., drops to a tube. After inoculating with the suspected material, the tubes are incubated, and on the day following the procedure is repeated, using the tube next below that which shows the smallest amount of growth. In the second series, Parietti's solution is added in the same manner, commencing with the number of drops as contained in the tube used to inoculate from.

* Centralblatt für Bakteriologie, 1900.

Three or four days of this procedure will eliminate the more rapid-growing putrefactive bacteria, and cultures should be made upon plain agar tubes, which in this work are preferable to plates. From the broth cultures selected, it is well to make about one hundred agar cultures, which are examined on the following day after being incubated. Tubes which show no colonies resembling typhoid are at once discarded. Tubes showing colonies similar to typhoid, are taken and cultures made from the typhoid-like colonies upon lactose-litmus agar. Any of these cultures on lactose-litmus agar, which show a reddening of the medium after being incubated for two days, are thrown aside as of no further value. Those which still remain blue are retained and fermentation tubes inoculated. If no gas is introduced, the Widal typhoid reaction is tried, and if the characteristic clumping is obtained, it proves the presence of the typhoid bacillus.

This, then, is very briefly the method of Hankin. I was very fortunate in succeeding upon the first trial in isolating this germ where the Hiss and Capaldi methods had failed to reveal its presence.

The success one meets with in using this process is not so much a matter of technique as it is of having an unlimited supply of culture media on hand with which to proceed.

In connection with this examination, a control containing typhoid was carried in order to check the results obtained from the suspected matter.

This is the simplest and most efficient method I have yet tried for isolating this germ, which is always so closely associated with bacillus coli.

ANTHRAX.

Acting on instructions received September 2 from Dr. D. McEachran, Chief Inspector of Live Stock, I left for the North-west to assist Dr. Hargrave in stamping out and controlling an outbreak of anthrax occurring in the sheep belonging to the Canadian Land and Ranch Company at Swift Current, arriving at the ranch on the 6th, where I was met by Dr. Hargrave.

At the time of my arrival the outbreak had been stopped by moving the sheep progressively off the infected area. Microscopic examinations were made of various dead animals in which the diagnosis of anthrax was confirmed, and in addition to this microscopic examination, 'gophers' were inoculated with the earth from around carcasses, dying inside of twenty-four hours of anthrax.

The inconvenience caused by not being able to get vaccine with which to start the inoculation of the sheep was great, as it was desired that they all be inoculated before weaning the lambs and their removal to their winter quarters.

The vaccine when it did come, came in small lots, necessitating great delays, for it was necessary to do a band consisting of two thousand at a time, it not being possible or practicable to divide the flocks.

The result of the vaccinating was not wholly satisfactory owing to the great number of deaths occasioned by the use of vaccine supplied to us. Following is the report of Dr. Hargrave and myself upon the result of the use of the vaccine on the sheep.

SWIFT CURRENT, ASSA., N.W.T., October 2, 1901.

SIR,—We have the honour to submit the following report concerning the vaccination of sheep, the property of the Canadian Land and Ranch Company at their ranch at Swift Current, Assiniboia, N.W.T.

With one lot of vaccine sent us there have been vaccinated 4,673 sheep, including fat sheep and yearlings. Since vaccinating the number of deaths has been 475.

Three thousand eight hundred and one ewes and lambs have been vaccinated with first lymph supplied from the same source, but owing to the excessive death rate in those receiving both lymphs it was not considered advisable to apply the second lymph.

With Pasteur's vaccine 4,000 ewes and lambs have received both lymphs.

The other vaccine has impressed us as being carelessly prepared, evidence of putrefactive change being present in many of the vials. The amount of undiluted material varied in both lymphs from one to four cubic centimeteres in vials that were measured.

Pasteur's vaccine has in every instance appeared uniform in colour and consistency, and without odour save that natural to the bacillus anthracis.

The sheep vaccinated with the first supply of vaccine have after the application of the first lymph, presented an enlargement at the side of inoculation varying in size from a pea to a pigeon's egg. No inflammatory change was noted in any case after Pasteur's first lymph.

Dr. Hargrave will supply further detailed report of the deaths among all the vaccinated sheep, which report is at present incomplete, sufficient time not having elapsed since the use of Pasteur's second lymph to determine its effects.

We have the honour to be, sir, your obedient servant,

(Signed) J. C. HARGRAVE,
Inspector.

" CHAS. H. HIGGINS,
Assistant Pathologist.

Dr. D. McEACHRAN,
Chief Inspector of Stock,
Montreal, Que.

At the time of the original outbreak the disease was contracted by the manager of this ranch, Mr. Alexander, and one of the shepherds, but in neither instance did it prove fatal having been promptly treated.

MICROSCOPIC EXAMINATIONS.

This refers to the work for diagnosis upon specimens sent in by inspectors in the event of an outbreak of a contagious disease. It is not necessary to dilate upon these reports, as a report of the outbreak provided the examination revealed the infective agent is to be found in connection with that of the inspector reporting the outbreak of disease.

TUBERCULIN TESTING.

In connection with my regular experimental work I have tested 105 head of thoroughbred cattle, most of which were for export to the United States, and in this number have had 17 reactions, which reacting animals have been placed in quarantine.

I have the honour to be, sir,
Your obedient servant,

CHAS. H. HIGGINS,
Assistant Pathologist.

To the Honourable
The Minister of Agriculture,
Ottawa.

No. 17.

CATTLE QUARANTINE.

(M. C. Baker, D.V.S.)

Montreal, October 31, 1901.

Sir,—I beg to report that during the year ending October 31, 1901, I have inspected and passed for shipment from the port of Montreal, at the Canadian Pacific Railway Company's stockyards of this city, 45,619 head of cattle and 13,616 sheep. Of these 5,386 head of cattle and 896 sheep were from the United States.

The monthly inspections, which have been already forwarded to the department, are as follows :—

	Head of Cattle.	Sheep.
November 1900	7,019	2,451
May, 1901	2,834	336
June, 1901	4,004	1,900
July, 1901	5,214	2,736
August, 1901	9,273	2,173
September, 1901	11,138	1,161
October, 1901	6,137	2,859
Total	45,619	13,616

The number of cattle shipped from this port in October is much less than in the same month of last year. This is owing to the fact that during the month there were shipped via Boston and Portland nearly 5,000 head of cattle from Canadian Pacific Railway stockyards.

Of the cattle inspected at the Canadian Pacific Railway stockyards and included in the above list, 783 head were shipped from Quebec, the balance from Montreal.

During the year there were rejected 36 head of cattle and 3 sheep. Of these animals rejected only one was affected with actinomycosis, the balance were injured or lame. The cattle and sheep that have been inspected demonstrate that the Dominion is remarkably free from disease.

Acting on instructions received from the department, I visited the county of Welland, Ontario, to investigate a reported outbreak of rabies, but was unable to determine if the animals that were supposed to have died of rabies or had been killed on account of having been suspected of having the disease really had rabies. I reported fully at the time of making the investigation. The inoculations made by Dr. Higgins from portions of the brain of the animal on which I made a post-mortem examination, did not give any definite results.

As there have been no further cases reported, we must conclude that if the suspected animals really had rabies, all that became inoculated either died or were killed.

I have the honour to be, sir,

Your obedient servant,

M. C. BAKER, D.V.S.,

Inspector.

The Honourable

The Minister of Agriculture,

Ottawa.

No. 18.

CATTLE QUARANTINE.

(Charles McEachran, D.V.S.)

Montreal, October 31, 1901.

Sir,—I have the honour to report that during the year commencing November 1, 1900, and ending October 31, 1901, 1,160 horses have been inspected by me, and exported from the port of Montreal to Great Britain. Forty-four horses were held back on account of being slightly affected by a contagious and infectious disease, viz., 23 from influenza and 21 from strangles.

I have the honour to be, sir,
Your obedient servant,
CHARLES McEACHRAN,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 19.

CATTLE QUARANTINE.

(B. A. Sugden, D.V.S.)

Montreal, October 31, 1901.

Sir,—I beg to report that during the period extending from November 1, 1900, to October 31, 1901, there were inspected and passed for shipment at the Grand Trunk Railway stock yards, Montreal, 34,914 cattle, of which 3,043 were from the United States, and 32,959 sheep, of which 15,914 were from the United States.

The shipments were distributed as follows :—

—	Canadian Cattle.	United States Cattle.	Canadian Sheep.	United States Sheep.
November, 1900	2,233	34	1,787	.....
May, 1901	7,533	1,218	171	7,947
June, 1901	7,147	391	1,247	4,872
July, 1901	4,971	238	3,718	2,864
August, 1901	3,712	322	3,651	231
September, 1901	2,618	234	2,929	.....
October, 1901	3,657	696	3,542	.....
	31,871	3,043	17,045	15,914
		31,871		17,045
	Total cattle.	34,914	Total sheep.	32,959

There were rejected 27 head of cattle, four of which were cows apparently suffering from tubercular lesions of the udder, the balance being held back for injuries.

Thirty-four sheep were rejected for lameness and injuries received during transportation.

I have the honour to be, sir,
Your obedient servant,

B. A. SUGDEN, D.V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 20.

CATTLE QUARANTINE.

(A. E. Moore, D.V.S.)

Montreal, October 31, 1901.

Sir,—I have the honour to submit the following report of work done by me during the past year from November 1, 1900, to October 31, 1901.

TUBERCULOSIS.

I beg to report that I have tested 680 head of cattle for tuberculosis during the past year, 123 were tuberculous and 5 suspicious. Of this number 115 were tested for export to the United States for breeding purposes. Eighteen of these reacted and are in quarantine on the premises of the owners.

I inspected the beef of 47 of these tuberculous animals, 19 were fit for food, the others either had generalized tuberculosis or were too thin for food. One herd of 17 dairy cows were too thin for beef, but the owner insisted on killing them immediately, as he did not wish to incur expense of getting them into condition for beef.

All the other cattle that reacted are still alive and in quarantine on the owner's premises.

Ninety-two of the above diseased animals were from three herds, viz., 57 tuberculous out of a herd of 72, 18 out of a herd of 21, and 17 out of a herd of 20. This is an interesting instance in that it shows the great importance of good ventilation. These stables were all kept fairly clean and dry, but there was little or no provision made for ventilation, there being far too little breathing space for each animal, for example, the stable having 20 cows was 30 feet long by 20 feet wide, and 6 feet high, only three escaped the disease and 2 of these stood nearest the door which was not very tightly closed.

In another stable the temperature was generally kept at 65 to 70 degrees F. in the winter (from the heat of the animals), the building being kept tightly closed up, consequently about 80 per cent of a very large herd became tuberculous. These animals all contracted the disease within two years, having been tested two years previously and found healthy. The source of infection was a cow with generalized tuberculosis, having a profuse discharge from the uterus, which was a mass of disease.

ANTHRAX.

Fifty-six cattle and two horses have died from anthrax in districts investigated by me during the year, 35 cattle in Ontario, 18 cattle and 2 horses in Quebec, 3 cattle in New Brunswick. I have vaccinated 75 herds, numbering 887 cattle with the Pasteur anthrax vaccine. The results have been very satisfactory, no deaths having been reported from those that have been vaccinated, and many of these animals were allowed to graze on the contaminated pastures, after inoculation.

In the neighbourhood of Oznabruck, Lunenberg and Newington (Cornwall and Stormont Counties, Ontario), there were about 30 deaths in cattle from anthrax. The disease was somewhat scattered but was confined to farms along the course of a creek. The neighbours were very much alarmed and anxious to have their herds vaccinated. Over 1,000 cattle were vaccinated in this district by Dr. Higginson and myself.

BLACK LEG.

Fourteen deaths confined to three farms have occurred from black leg on farms where I have investigated on instructions from the department. These carcasses were burned ; the surviving young cattle on each farm I vaccinated with Pasteur cord vaccine.

GLANDERS.

Four horses belonging to Mr. L. P. Cramer, of Windsor Mills, P.Q., reacted to the mallein test. They were destroyed at the owner's request. His premises have been renovated and carefully disinfected, and I have tested with mallein his two other horses which were exposed for a short time, and found them free from the disease.

Mr. Cramer himself contracted the disease, which shows the danger of contact with glandered horses.

I have the honour to be, sir,
Your obedient servant,

A. E. MOORE, D.V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 21.

REPORT ON POINT LEVIS CATTLE QUARANTINE STATION.

(J. A. Couture, D.V.S.)

Quebec, P.Q., October 31, 1901.

Sir,—I have the honour to forward my report, for the last twelve months, of live stock imported into this quarantine.

During that period we have received 390 cattle, 1,108 sheep, 63 pigs, a total of 1,561 animals.

CATTLE.

The cattle were of the following breeds :—266 Shorthorns, 50 Polled Angus, 30 Simmenthalers (Swiss), 21 Galloways, 13 Ayrshires, 10 Guerneseys.

Their destinations were as follows :—

	For Canada.	For U. States.
Shorthorns	219	47
Polled Angus	...	50
Simmenthalers	...	30
Galloways	7	14
Ayrshires	13	..
Guerneseys	10	..
Total	249	141

There were born in quarantine 7 calves. Two calves died.

Twelve cattle were tested with tuberculin.

SHEEP.

The sheep were of the following breeds:—466 Rambouillets, 293 Shropshires, 131 Lincolns, 90 Cotswolds, 49 Oxfords, 37 Hampshires, 22 South Downs, 20 Dorsets.

Their destinations were as follows :—

	For Canada.	For U. States.
Rambouillets	68	398
Shropshires	174	119
Lincolns	...	131
Cotswolds	85	5
Oxfords	12	37
Hampshires	6	31
South Downs	17	5
Dorsets	19	1
Total	381	727

PLAN OF PTE. LEVIS LIVE STOCK QUARANTINE

PIGS.

The pigs imported were as follows :—57 Yorkshires, 4 Large Blacks, 3 Tamworths, 2 Berkshires, a total of 63.

All were for Canada, except 5 Yorkshires.

I am glad to report that there was no contagious disease during the past twelve months among animals arriving at this quarantine.

I have the honour to be, sir,
Your obedient servant,
J. A. COUTURE,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 22.

REPORT ON ST. JOHN CATTLE QUARANTINE STATION.

(J. H. Frink, D.V.S.)

St. John, N.B., October 31, 1901.

Sir,—I have the honour to submit annual report of work at this station. The total export of live stock to Great Britain from this port numbered 25,681, made up as follows :—

Canadian cattle	8,546
Canadian sheep	6,727
United States cattle	3,289
United States sheep	6,892
United States horses	17
Canadian horses	210
Cattle condemned	2
Sheep condemned	1
Horses condemned	1
Detained and reshipped	2
Killed in transit	22

These animals were all inspected, and no contagious disease was found in them. One horse condemned with pneumonia, one bull with foot foul, and a steer with acute bronchitis, were sent to the abattoir. One United States sheep badly affected with foul in the foot was sent the same way. Twenty-two animals were killed or injured sufficiently in transit to necessitate their destruction. Deaths and injury were most noticeable in shipments of sheep. Very great improvements have been made by the Canadian Pacific Railway at St. John West, in regard to the accommodation of live stock for export. A large area has been covered with suitable stables, with excellent facilities for food and water, capable of containing at least 1,200 head of stock. These yards and stables have been placed within a hundred feet of the face of the docks, and will prove of great convenience to cattle-carrying ships. With existing facilities, shippers may forward their cattle days before loading, and have them obtain rest and food before being placed on shipboard. This work has been accomplished none too soon. The imports of stock from abroad have been light, and consisted of six stallions imported by Col. Dent for improvement of stock, thirteen

thoroughbred cattle from Great Britain, which were detained ninety days in quarantine, and one cattle and eleven swine for breeding purposes from the United States.

No export of cattle has been made to the United States from this province during the year. A few years ago a very large number of high grade milch cattle were taken up by United States buyers. This trade has been discontinued, as our farmers, more readily than ever, realize the advantage of keeping this class of cattle in the country.

One animal was tested for tubercle prior to export to West Indies, belonging to Mr. James Friars, Shediac, N.B., and passed satisfactorily.

There is no contagious disease of animals in this province, except tuberculosis and actinomycosis.

I have the honour to be, sir,
Your obedient servant,
JAMES H. FRINK,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 23.

REPORT ON HALIFAX CATTLE QUARANTINE STATION.

(Wm. Jakeman, D.V.S.)

Halifax, N.S., October 31, 1901.

Sir,—I beg leave to submit the following statements of animals inspected during the twelve months, ended October 31, 1901.

EXPORTED.

Horses	83
Mules	—
Cattle	301
Sheep	1,098
Swine	9

IMPORTED.

Horses	11
Mules	—
Cattle	1
Sheep	—
Swine	—

In addition to these 200 cattle *ex* ss. *Martello* from United States, arrived with propeller broken, were placed in quarantine while repairs were being made.

I have the honour to be, sir,
Your obedient servant,
WM. JAKEMAN, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 24.

REPORT ON HEALTH OF LIVE STOCK IN ONTARIO.

(Andrew Smith, F.R.C.V.S.)

Toronto, October 31, 1901.

Sir,—I have the honour to make the following report on the health of the domestic animals in the province of Ontario during the past year.

HORSES.

No special outbreak of disease in this province. But influenza and strangles—both in rather a mild form have occurred to a greater or less extent, more especially in cities and crowded localities, with very few fatal results from either disease, I believe. Horses generally in good health. Two cases of glanders were reported by Mr. Armstrong, V.S., of Sparta, both were destroyed.

CATTLE.

Some cases of anthrax were reported in the neighbourhood of Millbrook. Investigation proved that a few cases that were believed to be anthrax had occurred in that locality, but that the disease had not spread much amongst the herds on the farms on which it had appeared, and that it had not been communicated from farm to farm, the farms on which it had occurred being widely apart. Some other cases of the disease have been reported. But it does not appear to have spread to any extent.

A large number of cattle are brought into the Toronto cattle market. These are mostly fat cattle in prime condition for butchering. Any of these that present any indications of disease are held to be butchered under veterinary inspection, and only a very few have been condemned as unfit for food, as the result of the post-mortem examinations. The cattle brought in are, as a rule, good grades in prime condition and healthy. Throughout this district cattle are generally healthy.

SHEEP.

Generally healthy—Mr. Gerrow, V.S., of Woodville, reports some cases of scab near Dalrymple, P.O.

SWINE.

Generally healthy—No outbreaks of contagious disease in this locality. But outbreaks have occurred in the districts of Windsor, Wallaceburg and Chatham, which have been reported to the department.

I have the honour to be, sir,
Your obedient servant,
ANDREW SMITH, *F.R.C.V.S.*

The Honourable
The Minister of Agriculture,
Ottawa.

No. 25.

REPORT ON POINT EDWARD CATTLE QUARANTINE STATION.

(Arthur Brown, D.V.S.)

Sarnia, October 31, 1901.

Sir,—I have the honour to submit my annual report of cattle and swine received into the Ontario cattle quarantine at Point Edward for the year ending October 31, 1901.

The swine imported were of good quality, a preference being shown for White Chesters.

There have been no diseased animals in the quarantine this year, and I may state that no contagious disease exists in this district, with the exception of some cattle with tuberculosis and actinomycosis.

There have been two outbreaks of hog cholera during the past year in my district, but, owing to proper cleansing and disinfection of the premises, and the destruction of diseased animals and animals that were in contact with those diseased, I hope that it has been stamped out.

Attached you will find a statement including animals received into quarantine, animals that were imported by settlers, and cattle imported for breeding purposes, that did not require to be placed in quarantine.

I have the honour to be, sir,
Your obedient servant,
ARTHUR BROWN, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

Statement of animals imported at Point Edward during the twelve months ended October 31, 1901.

Cattle	18
Sheep—	
Rams	2
For Toronto Exhibition	13
Swine	7

Also, eighteen cattle and 255 sheep returned from the Fat Stock Exhibition, Chicago.

ARTHUR BROWN, V.S.,
Inspector.

No. 26.

REPORT OF S. E. BOULTER, V.S., INSPECTOR AT NIAGARA FALLS, ONT.

NIAGARA FALLS SOUTH, ONT., October 31, 1901.

SIR,—I beg to submit a short summary of work done by me in the interests of the department in the Niagara district during the year ending October 31, 1901.

Two cases of hog cholera have been reported to me during the year by Dr. Whybra, of Stevensville, both cases being in the township of Bertie. On investigation, I found the cases were not cholera, as reported. And it is very gratifying to be able to report that there have been no cases of hog cholera in this district during the past year. One case of anthrax was reported from Crowland township, two animals having died on one farm. The cases were undoubtedly symptomatic anthrax. The remainder of the animals were removed to higher-lying lands, and no others were affected.

Rabies was reported to be existing in the township of South Pelham, as the result of a dog bite, and I believe one mare and one cow died, showing unmistakable symptoms of rabies in the furious form. Six animals died in the same neighbourhood, and all about the same time, from a form of paralysis commencing usually in one hind leg and gradually affecting all the extermities ; then cerebral disturbance became manifest, and death closed the scene in from three to five days after the first symptoms appeared. These cases have not been clear to me, as to the exact cause of the disease, and until I receive the report of the bacteriologist, I shall report it as rabies in the dumb form.

The district throughout has been very free from contagious diseases. During the past twelve months I have inspected four cattle, three sheep and thirteen swine imported from the United States.

I have the honour to be, sir,

Your obedient servant,

S. E. BOULTER, V.S.,

Inspector.

The Honourable

The Minister of Agriculture,

Ottawa.

No. 27.

REPORT ON INSPECTION WORK IN PRINCE EDWARD ISLAND.

(W. H. Pethick, V.S.)

Bedeque, P.E.I., October 31, 1901.

Sir,—I have the honour to furnish you with my annual report, and am glad to be able to say that the health of live stock on Prince Edward Island continues good. No outbreak of contagious disease having occurred. I have, however, been called to visit the following places to investigate the reported existence of contagious disease : Cavandish, Rose Valley, Cape Traverse (on three occasions), Darnley, Kinkora, Middleton, Clifton, Searletown, Bridgetown, Wilmot, Graham Road, South Shore, Tryon, French River and Newton. I endeavoured to attend to all such cases brought under my notice and made diligent inquiry in order to enable me to ascertain the nature of the disease, but am glad to say that in no instance did I find evidence to confirm the report or justify quarantine.

You will be pleased to notice by the charts which have from time to time reached you, that no animal has reacted to the tuberculine test. A number of breeding animals examined by me under the United States regulations were healthy, as were all incomming cattle examined in accordance with out provincial Quarantine Act. My absence during a portion of the summer will explain the limited number of shipments of live stock examined by me previous to departure for foreign ports. Mr. A. Leckie, M.R.C.V.S., of Charlottetown, acting in my place.

I have the honour to be, sir,

Your obedient servant,

W. H. PETHICK, *V.S.*

The Honourable
The Minister of Agriculture,
Ottawa.

Statement of animals inspected by W. H. Pethick, V.S., previous to shipment by sea from the port of Summerside during the twelve months, ended October 31, 1901.

Horses	11
Cattle	264
Sheep	186
Swine	9

W. H. PETHICK, V.S.,
Inspector.

No. 28.

REPORT OF VETERINARY INSPECTOR AT WINNIPEG, MAN.

(Chas. Little, V.S.)

Winnipeg, Man., October 31, 1901.

Sir,—I have the honour to report to you the result of inspections made by me at this post for the year beginning on the 1st day of November, 1900, and ending this 31st day of October, 1901. This report includes the number of animals I have tested for tuberculosis in the city dairies. Also the number tested to go to the States.

The following animals belonging to immigrants were inspected :—704 horses, 4 mules, 900 cattle, 114 sheep and 89 hogs.

In addition to the above, I inspected two thousand one hundred and twenty-five (2,125) head of horses and mules that were brought in for sale, and for circus, racing and exhibition purposes being a total of :

Horses and mules	2,829
Cattle	900
Sheep	114
Hogs	89

I also tested 51 head of dairy cattle, 9 of which were diseased and placed in quarantine.

I have tested 41 head of pure bred animals for export to the States, one of which was diseased and placed in quarantine. I also gave certificates for 1,100 head of stockers for export south.

I was called upon to investigate one outbreak of black leg in which five animals died. I disposed of 200 doses of Pasteur's black leg vaccine cord to parties wishing to vaccinate their animals. The vaccine was sent to me by your department.

I have the honour to be, sir,

Your obedient servant,

CHAS. LITTLE, *V.S.*
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 29.

REPORT OF THE NORTH-WEST MOUNTED POLICE COMMISSIONER.

(A. Bowen Perry.)

Regina, October 31, 1901.

Sir,—I have the honour to forward my annual report of work performed by the North-west Mounted Police for your department during the twelve months ended October 31, 1901, together with the annual reports of the following veterinary inspectors, giving in detail the various duties performed by them :

Inspector Burnett, V.S., Macleod.
Staff Sergt. Fraser, Macleod.
" Farr, V.S., Coutts.
" Hobbs, V.S., Calgary.
R. Riddell, V.S., Calgary.
Staff Sergt. Sweetapple, V.S., Fort Saskatchewan.
" Mountford, V.S., Prince Albert.
" Mitchell, V.S., Regina.
" Ayre, Regina.
" Matthews, V.S., Regina.
" Coristine, V.S., Maple Creek.
" Tracey, V.S., Battleford.
J. Hargrave, V.S., Medicine Hat.

The general health of horned stock throughout the Territories has been good, and there has been no serious outbreak amongst them of any contagious disease.

Mange, which it was feared might be prevalent during the winter months, fortunately was less common than in former years, and with the advent of spring and green grass, nearly disappeared. There has been no outbreak of anthrax, but isolated cases have appeared in different parts of the Territories.

Actinomycosis appeared in all parts of the Territories, but I think less than in former years, certainly so amongst the range cattle. There have been a few cases of tuberculosis reported, principally amongst imported stock.

HORSES.

Horses have suffered much from typhoid fever during the past year, chiefly in the Prince Albert and Edmonton districts, though some cases were reported from Medicine Hat.

Glanders is, I regret to say, still a great deal more prevalent than is desirable, but every effort is being made to stamp it out, and the number of horses destroyed during the past year is less than during the preceding year.

About 47,167 head of fat cattle were inspected for export, out of which a few were found diseased and rejected.

The following table shows shipping points and number of cattle shipped :—

Regina and district	6,120
Qu'Appelle	2,045
Maple Creek	5,899
Rush Lake	699
Lethbridge	4,639
Macleod	1,386
Pincher Creek	606
Calgary	14,842
Medicine Hat	5,600
Claresholme	1,430
Cayley	145
Moosomin and district	3,756
Total	47,167

Cattle shipped from Prince Albert, Saskatchewan and Dundurn would bring the total number to over 50,000.

Every precaution has been taken not to delay shippers, but as there will often be several shipments in one district at widely different points, assistance has sometimes to be called in to aid our permanent staff.

Two thousand nine hundred and forty-two cattle were inspected at North Portal, the property of settlers, and 2,984 horses were inspected at the same point ; at Maple Creek, 103 cattle and 555 horses ; at Coutts, 3,980 cattle, 1,492 horses and 11,486 sheep.

Eight thousand five hundred and sixty sheep were imported at Maple Creek, and 41,565 were imported south of Cardston, just at the end of October.

A total of $2,081.39 has been collected as inspection fees at different ports of entry, not including amount collected on sheep imported south of Cardston, and refunded to your department.

CATTLE.

Actinomycosis is generally distributed throughout the Territories, but is yearly decreasing. A marked decrease in the number of cases amongst range cattle is most noticeable, due, in a great measure, to the prompt action of stockmen who, whenever an animal is found suffering from this disease, shoot it, and either burn of bury the head. This disease was most prevalent in the Prince Albert district, thirty-six cases being reported from there. Forty-five cattle suffering from this disease were destroyed during the past year in the Territories.

Anthrax.—There has been no outbreak of this disease, but cases have occurred here and there throughout the Territories. One outbreak was reported at Carstairs, but on investigation no anthrax germs were discovered in the specimen forwarded to the pathologist at Montreal. Dr. Hargrave gives it as his opinion that symptomatic anthrax was the cause of death. After inoculation with blacklegine, no further deaths occurred.

Mange.—During the winter of 1900-1901, mange was more or less prevalent throughout the range country, but not to a serious extent. Cattle affected were taken up and treated by their owners, and with the advent of warm weather and green grass, the disease apparently disappeared. Some member of the force attended all the large round-ups, and the number of cattle reported as suffering from mange was extremely small, as the following shows :—

Calgary District, 1,850 head ; no mange.

Mosquito Creek, 8,000 head ; one case.

Cochrane Ranch, 7,800 head ; no mange.
Pincher Creek, number not given ; no mange.
Oxley Ranch, 15,000 head ; five cases.
Circle Ranch, number not given ; three cases.
Cypress Hills, number not given ; no mange.

This is a very satisfactory showing, but it remains to be seen what effect a long and severe winter may have in reproducing this disease. At present there are cases of mange in the Sheep Creek and High River districts. Material has been shipped to the owners of the affected animals to treat them under the supervision of our inspector at Calgary. The disease also exists in certain sections of the Cypress Hills, but to a small extent.

SHEEP.

Anthrax.—This disease occurred near Swift Current, amongst sheep owned by the Canadian Land and Ranch Company. Dr. Hargrave, V.S., of Medicine Hat, was in special charge during the continuance of the outbreak. Prompt measures were taken at once to isolate the infected district and to prevent any stock from being driven across or entering on the quarantined area, and all carcasses were burned without delay, and in a short time the outbreak was under control. The outbreak commenced in the beginning of August, and up to the 26th of the same month, some 2,500 sheep died. On September 7, Dr. Hargrave, V.S., and Dr. Higgins, of Montreal, began to vaccinate the sheep, using two different kinds of vaccine, considerable loss resulting from the use of one kind, a full account of which is given in Dr. Hargrave's report. This band at the end of the year appeared to be quite healthy. The range they had been using was to have been burned over, but snow coming early prevented this. The state veterinarian of Montana wrote in some alarm about this outbreak, fearing that the disease might be carried across the line by birds or antelope, and it was reported in Montana that large numbers of antelope had mysteriously died on Canadian territory, but after careful inquiry I am convinced that there is no truth in this statement.

The Montana authorities were written to and told that every precaution had been taken to prevent the spread of the disease.

Foot rot was reported amongst a band of sheep at Wood Mountain, but on examination there were found to be but few cases. The cause was running the sheep on wet ground, and on their being driven to higher and dry ground, the disease soon disappeared.

Scab.—None has been reported.

HORSES.

Glanders.—This disease is still much too common, and cases have occurred all over the Territories, the greatest number, perhaps, being in Eastern Assiniboia. People are fully alive to the dangers of this dread disease, and report promptly any suspicious symptoms in their horses, and a great deal of the veterinary inspectors' time is taken up in examining and testing suspicious cases. Col. Dent complained of glanders appearing in horses purchased by him in the Maple Creek and Medicine Hat districts. An order was sent to the officer commanding that district, to have his quarantine inspectors examine all horses in the Cypress Hills. This work was commenced, but as the horses were scattered over an immense tract of country, and most of them quite unbroken, it was found quite impossible to make a thorough examination, unless there was a general round-up of all the horses. Your department was consulted on this point, and the matter is now under consideration.

I believe it is the intention of the department to issue a pamphlet for distribution on 'Glanders,' and this will supply a long felt want.

Ninety horses were destroyed during the year, distributed as follows :—

Macleod and Lethbridge district	1
Maple Creek district	45
Calgary district	5
Prince Albert district	6
Fort Saskatchewan district	6
Regina and district	27
Total	90

Typhoid fever has been common as usual in the northern districts ; very little seems to be known of the cause and nature of this disease, and there is much to learn. One prime cause appears to be the drinking of polluted water, a large amount of stock being watered from sloughs in close proximity to drainage from the barn-yards. Dirty and ill ventilated stables is likely another cause. The disease is very fatal and even if the horse recovers, in most instances he is a physical wreck and quite unfitted for any work.

Strangles has been accountable for the death of quite a number of horses during the past year.

Equine Syphilis.—Strict injunctions were issued to all veterinary inspectors to make a thorough examination of all stallions and mares imported from the States. No cases of this disease were reported.

GENERAL REMARKS.

Dr. Hargrave, V.S., of Medicine Hat was appointed to test cattle for breeding and dairy purposes for export west of Moosejaw and Dr. Charles Little, V.S., of Winnipeg, east of Moosejaw.

Blackleg vaccine was supplied by your department and sold at cost price to stock men for the inoculation of young stock. The total quantity disposed of by the police was 575 doses. The intention of the government to do this was widely circulated and quite a few ranchers took advantage of it, and next season I am certain a large quantity of vaccine will be required to meet increased demands. I know only of one case where a calf that had been vaccinated died.

Authority was granted allowing settlers coming in from the United States with small bands of sheep which were free from disease, but for which no health certificate was held, to be passed and to proceed to their destination.

There promises to be a large importation of sheep from Montana next year into the country from about south of Swift Current to the mountains. Special instructions have already been received to have a most careful examination made, particularly for scab, of all imported sheep and these instructions will be rigidly carried out. There is some friction now between cattle and sheep men in the Cypress Hills, and is always likely to be when cattle and sheep are present on the same range, and I would strongly recommend that the portions of country set apart for sheep grazing be made public, and that the sheep be not allowed to graze outside these limits.

There is one subject that demands attention and that is the importation of a worthless class of horses by half-breeds and Indians. They go south of the line and acquire a certain number of ponies which they smuggle into the Territories.

Apart from these being an undesirable class of animal they are not inspected by any veterinary surgeon, and as a consequence glanders or other infectious or contagious diseases can be introduced.

During the past year several seizures of such stock have been made, and in every case the owners have been allowed to regain possession of their horses on paying duty and expenses.

In one case where the horses had been brought in by half-breeds some had actually been sold, still they were allowed to pay the duty and go scot free. Until more severe measures are taken Indians and half-breeds will continue to smuggle in horses and take chances of being caught. If they are caught it means just paying duty and if not caught they are that much ahead.

I have the honour to be, sir,

Your obedient servant,

A. BOWEN PERRY,
Commissioner, N.W.M.P.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 30.

REPORT OF VETERINARY INSPECTOR AT NELSON, B.C.

(J. A. Armstrong, V.S.)

Nelson, B.C., October 31, 1901.

Sir,—I have the honour to submit to you this my report for the year ending October 31. I beg to say that this country has been very free from disease, there being only one outbreak during the year, viz., glanders in the stable of Warden Brothers, three horses having to be killed.

The following is a statement of the stock imported into this district during the year :—

Horses	294
Mules	4
Cattle	89
Sheep	7,614
Swine	10

I have the honour to be, sir,

Your obedient servant,

J. A. ARMSTRONG, V.S.,
Inspector.

The Honourable.
The Minister of Agriculture,
Ottawa.

No. 31.

REPORT OF VETERINARY INSPECTOR AT GRAND FORKS, B.C.

(S. C. Richards, V.S.)

Grand Forks, B.C., October 1, 1901.

Sir,—I have the honour to submit my annual report of animals imported into the Kettle River district for the year ending October 31, 1901.

Total number of animals inspected : Horses, 193 ; cattle, 45 ; hogs, 43 ; sheep, 487 ; mules, 1.

It is my pleasure to state that the condition of all the cattle in the district is good, and that glanders has been successfully stamped out.

I have the honour to be, sir,

Your obedient servant,

S. C. RICHARDS, V.S.,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 32.

REPORT OF VETERINARY INSPECTOR AT VANCOUVER, B.C.

(J. B. Hart, V.S.)

Vancouver, B.C., October 31, 1901.

Sir,—I have the honour to report this district as being comparatively free from contagious disease.

There is still a percentage of tuberculosis and actinomycosis ; but the tuberculin test is becoming more popular with breeders and shippers as they learn of its practical infallibility, and I trust a few years of watchful care will see bovine tuberculosis practically weeded out.

Sheep scab and foot rot are heard of, but not seen. I investigated a reported case of the latter, but it proved nothing more serious than softened tissue on the flock being moved from dry, hard, hill pasture to soft wet bottom land.

Symptomatic anthrax or blackleg exists in certain sections. But the mortality is being largely diminished by the preventive, blacklegine or blackleg vaccine, furnished at a nominal figure by the Dominion government. Of the animals examined and tested for export to the United States, I have had to refuse certificates for and condemn seven head.

I have the honour to be, sir,

Your obedient servant,

J. B. HART, D.V.S.,

Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 33.

REPORT OF VETERINARY INSPECTOR AT VICTORIA, B.C.

(S. F. Tolmie, V.S.)

Victoria, B.C., October 31, 1901.

Sir,—I have the honour to submit to you a report of the animals inspected at Victoria during the year ending October 31, 1901.

Appended you will find a statement of the number of animals inspected.

I have detained animals in quarantine for the required periods, whenever necessary, in accordance with the regulations.

The health of animals in this district generally has been good, and I have found no cause to condemn any during the year.

I have applied the tuberculin test to twenty-two cattle without rejecting any.

The horses imported were nearly all of the driving and general purpose class; there were a few thoroughbreds.

The cattle were all dairy animals.

The sheep were principally stock sheep of medium quality, and some good pure-bred rams.

The farmers of this district are showing an increased interest in the improvement of their herds and flocks, and have patronized the government sales of live stock liberally.

This cannot fail to have a very beneficial effect on the quality of the stock.

I have the honour to be, sir,
Your obedient servant,
S. F. TOLMIE, V.S.,
Inspector.

The Honourable
The Minister of Agriculture,
Ottawa.

Statement of animals inspected at Victoria, B.C., during the twelve months ended October 31, 1901.

	Imported.	Exported.
Horses and mules	216	2
Cattle	37	4
Sheep	319	9
Swine	1	..

S. F. TOLMIE, V.S.,
Inspector.

No. 34.

REPORT ON PICTOU CATTLE DISEASE IN NOVA SCOTIA.

(Geo. Townsend, V.S.)

New Glasgow, N.S., October 31, 1901.

Sir,—I have the honour to submit herewith a statement showing the number of cattle slaughtered for 'Pictou Cattle Disease,' and amount of compensation paid therefor during the year ended October 31, 1901.

I have the honour to be, sir,

Your obedient servant,

GEORGE TOWNSEND, V.S.,

Statement of cattle slaughtered and amounts paid, from November 1, 1900, to October 31, 1901.

Month.	Number slaughtered.	Amount paid.	Month.	Number slaughtered.	Amount paid.
		$ cts.			$ cts.
November	8	57 00	Brought forward	24	171 33
December	4	20 00	May	12	90 00
January	2	13 33	June	20	155 00
February	1	5 00	July	18	148 33
March	4	31 00	August	9	84 00
April	5	45 00	September	4	35 00
			October	5	40 00
Carried forward	24	171 33	Total	92	723 66

GEORGE TOWNSEND, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 35.

REPORT ON LIVE STOCK CARS AND YARDS.

(M. Auger.)

Ottawa, October 31, 1901.

Sir,—I have the honour to submit to you my annual report covering the period from November 1, 1900, to October 31, 1901.

I am pleased to say that there has been some improvement in the cleaning of local live stock cars. Although there have been cases of neglect, which it is almost impossible to prevent, the different railroad companies handling live stock have shown a disposition to do what is right.

The live stock cars carrying cattle to and from the United States are duly cleaned and disinfected, and very few had to be returned for not being cleaned according to regulations.

During the year I had several cattle yards put in good order.

In compliance with your request in March last I visited the west as far as Victoria, B.C. I saw several officers of the Canadian Pacific Railway and the result was that several yards were put in proper condition.

I had intended returning there this fall, as it was rather early when I went, but have not yet been able to go.

About the middle of October, I visited, at your request, the cattle yards and sheds at West St. John, or Carleton, N.B. I found the Canadian Pacific Railway Company had covered their sheds, enlarged them and built others sufficient to cover over a thousand head of cattle at a time ; they were then dividing the different buildings, making stalls and putting in water tanks. The said works were expected to be completed in three weeks from that time, October 9, 1901.

I have the honour to be, sir,

Your obedient servant,

M. AUGER,

Inspector of Live Stock Cars and Yards.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 36.

REPORT ON THE TESTING OF CATTLE FOR TUBERCULOSIS IN GREAT BRITAIN DURING THE SEASON OF 1901.

GLASGOW, SCOTLAND, October 31, 1901.

SIR,—I beg to lay before you a brief report of the work performed by me as veterinary quarantine officer of your department, stationed during the past season in Great Britain.

Acting upon your instructions, I proceeded to England, arriving at Liverpool on April 8. On April 10, I presented your letters at the office of the High Commissioner in London, and after consultation with Lord Strathcona and Mr. Colmer, I decided to establish my headquarters in Glasgow, as very few cattle are shipped to Canada from any other British port. While in London at this time I called on Mr. Cope, F.R.C.V.S., chief veterinary officer of the Board of Agriculture, who, as did also his principal assistant, Dr. James McCall, expressed great interest in my mission, and gave me very much valuable information as to the conditions prevailing in Great Britain with reference to diseases of live stock.

I also visited Dr. T. A. Geddes, the special inspector representing the United States Bureau of Animal Industry, whose office is at the American Consulate in London. Dr. Geddes, having then been in Britain for some months, was able to give me many valuable hints as to the work before me. After making the necessary arrangements with the office of the High Commissioner, I proceeded to Glasgow, where Mr. Murray, the Canadian government agent, kindly gave me the use of part of his office, and then, as throughout the whole season, did everything in his power to assist me in the performance of my duties.

During April and May very few cattle were shipped to Canada, and I took advantage of the time thus placed at my disposal to inspect the lairages at Yorkhill, where the Canadian and American cattle are landed, as also to visit the corporation slaughter houses, with the object of acquiring some information as to the system of meat inspection carried on there.

In June, however, the export of cattle to Canada began in earnest, and has continued, practically without intermission, up to the present date. The last shipment will leave this port for Quebec to-morrow, November 1. During this period, my time was fully occupied in making the necessary tuberculin tests, the work being rendered most laborious by the fact that, while cattle are generally purchased in small lots, sellers, as a rule, absolutely refuse to have their animals tested anywhere save in their own stables.

As an instance of the way in which this condition works out, I may mention that on one occasion I found it necessary to occupy over three weeks, including Sundays, and to travel upwards of 2,500 miles, in testing thirty-four animals, twenty-six only of which were finally shipped.

When several buyers are at work at the same time, all anxious to ship at the earliest possible date, the pressure on the officer becomes very severe. Especially is this the case when a large proportion of the animals tested fail to pass, as this necessitates further testing in order to fill the gaps thus created. On several occasions, I found it absolutely impossible to get the work done, so as to avoid greatly inconveniencing buyers, without availing myself of your permission to employ assistance. When, however, it was at all possible to test the cattle personally, I spared no effort to do so. Much valuable time was spent in travelling, as small lots of cattle for the

same buyer were frequently situated long distances apart. Personally, I tested between April 24 and October 27, fifty-three lots of cattle, comprising 397 head. Mr. Wm. Marshall, M.R.C.V.S., of Aberdeen, tested for me twelve lots, comprising seventy-six head, and Mr. Wm. Bower, F.R.C.V.S., of East Rudham, Norfolk, tested one small lot of two cattle. Of these, all but five lots, aggregating sixty head, were tested between July 3 and October 27. July, August and October are by far the busiest months, and it is practically impossible for one man to do the work during this period without subjecting shippers to very serious inconvenience, while not enough cattle are exported during the rest of the year to furnish him anything like reasonable employment. Twelve of the animals tested by me were destined for direct shipment to United States ports, while Dr. Geddes also tested a few for shipment to Canada. On two lots sent to the United States via Quebec, we divided the work fairly evenly.

I regret to say that I found a good deal of prejudice against the tuberculin test among the breeders and owners of cattle in Great Britain. In some cases, this was due solely to lack of knowledge in regard to the matter, while in others it was but the natural consequence of the careless and slipshod methods followed in its application by some of the British veterinarians. The existence of this prejudice necessitated a a good deal of discussion and explanation, which, I am glad to say, appeared to have an excellent effect on many of those interested. The leaders of the veterinary profession in Britain are, to a man, in favour of the test as the best means of detecting tuberculosis, with a view to the adoption of intelligent means for its gradual eradication, and as a result of their efforts and of the action of the various foreign and colonial governments in insisting on its use, a more healthy public opinion is rapidly being created, which will soon lead to a marked improvement in the health of the herds.

That some such improvement is required, will be evidenced by the results of the work done during the past season on behalf of your department. Of the 475 cattle tested, as above stated, 357 passed satisfactorily, while 118 reacted, and were rejected as tuberculous. Of 358 cattle one year old and over, 112 reacted, while of 117 under one year, six only were found affected. Dealing with Shorthorns alone, the figures are as follows :—Of 299 animals one year old and over, 195 passed the test, and 104 were rejected, while of 106 head under one year, 100 were found free from disease, and six only failed to pass.

These figures show very conclusively that by the adoption of intelligent methods, the eradication of bovine tuberculosis can be achieved with much less difficulty and at a smaller pecuniary sacrifice than is generally supposed.

I regret that, owing to the pressure of work, I was unable to comply with your request that I should attend the International Congress on Tuberculosis, which was held in London in July. I had, however, the privilege of several interviews with Principal McFadyean, of the Royal Veterinary College, who is admittedly the highest authority on bovine tuberculosis in the English-speaking world, and who very kindly allowed me to benefit by his extensive experience. To Principal Dewar, of the Royal (Dicks) Veterinary College, Edinburgh and to Principal McCall, of the Glasgow Veterinary College I am also indebted for much valuable information, which was of great assistance to me in the performance of my duties.

The last shipment of cattle to Quebec for this season will leave Glasgow November 1, and in pursuance of the arrangement previously made with you, I will at once take passage for Canada.

I have the honour to be, sir,
Your obedient servant,

J. G. RUTHERFORD, V.S.

The Honourable
The Minister of Agriculture,
Ottawa.

No. 37.

BOARD OF AGRICULTURE.

MEMORANDUM AS TO THE IMPORTATION OF DOGS INTO GREAT BRITAIN FROM ABROAD.

1. The disease of rabies in dogs and of hydrophobia in man, which remains prevalent in almost all other parts of the world, has become practically extinct in this country, and the regulations of the Board are designed to prevent its re-introduction.

2. The importation of dogs into Great Britain from any foreign country, or British possession other than the Channel Islands, without the sanction of the Board is prohibited by orders made under the Diseases of Animals Act* ; and the landing of a dog from abroad (whether originally exported from Great Britain or not) will, unless a license has previously been obtained, render the owner liable to a penality of £20 and the possible seizure of the dog.

3. Every person who wishes to import a dog must make application in writing for the necessary license, on a form which will be supplied for the purpose, and the form should be accompanied by a letter addressed to the Secretary, Board of Agriculture, 4 Whitehall Place, London, S.W., explaining the circumstances under which the application is made, and stating how long the dog has been in the possession and personal charge of the applicant. It is to be understood, however, that an application is not necessarily followed by the issue of a license to land the dog, and that the Board cannot sanction the landing of dogs which usually live abroad, but which their owners while on a visit to this country wish to bring with them.

4. Every application must be made by the person who will be the owner of the dog during the period of detention in this country, and it should be forwarded in sufficient time to enable the Board to make full inquiries into the circumstances and as to the suitability of the premises in which it is proposed that the dog should be isolated, and to permit of their decision being communicated to the applicant before the dog is embarked. Masters of vessels cannot properly accept a dog for shipment to Great Britain from abroad unless the license is produced at the port of embarkation, and they are liable to prosecution if the dog is landed illegally.

5. In order that the Board may have it on record, that the conditions on which alone a license can be issued are fully understood, the applicant must sign the undertaking set out in one or other of the forms.

6. Unless the dog to be imported has, at the date of the application, been in the personal charge of the applicant during the preceding three months, the Board can only authorize its landing under a license, Form A, requiring the detention and isolation of the dog for six months. Such licenses are only issued where arrangements have previously been made for the detention of the dog for that period at an isolation station approved by the Board, at the expense of the owner, and at his risk. At the present time the only isolation station so approved is the Dog Sanatorium, Beddington Lane, Mitcham, Surrey, to the manager of which establishment communications respecting terms, &c., should be addressed.

7. Dogs landed with licenses, Form A, should be forwarded in crates or hampers, and with the utmost possible expedition, to the isolation station.

---

* NOTE.—The Dogs (Landing from Ireland) Order of 1899 imposes similar restrictions on the landing in Great Britain of dogs from Ireland.

8. If, however, the applicant is able to declare that the dog has been his personal charge for three months, he may apply for a license, Form B, which requires the detention of the dog for a period of six months on some suitable private premises to be specified by the applicant, and approved by the Board, where the dog will be under the supervision of the officers of the Board and of the local authority, for whose inspection it should be produced when required. If, however, the general conditions imposed are properly carried out, the Board are prepared, on the production of a certificate of a duly qualified veterinary surgeon that the dog is not affected with, or suspected of, rabies, to consider applications for the release of the dog after a period of ninety days.

9. The applicant's private place of residence is regarded in most instances as a suitable place of detention for a dog detained under a license, Form B, provided that he is the householder, and that no other dogs are kept upon the premises. Hotels, flats, lodgings, barracks or other similar premises where the dog cannot be conveniently isolated, or where the owner of the dog cannot guarantee that the animal can be detained for the full period required by the Board, are not regarded as suitable places of detention. For a similar reason, private residences are seldom suitable where more than one dog is to be imported. If the applicant has no fixed residence where the dog can be kept under his own charge, arrangements should be made for the detention of the dog for the necessary period at an isolation station, or on the premises of an experienced veterinary surgeon.

10. On arrival at a port in Great Britain, and before the dog can be landed, the holder of the license is required to produce it for the inspection of the officer of Her Majesty's Customs.

11. The license requires the dog when landed, to be taken by the nearest available route, and without unnecessary delay, to the premises specified therein and the arrival of the dog there must at once be notified in writing to the Board.

12. Where, however, dogs admitted under a license, Form B, are landed late in the day, and the place of detention is distant from the port, the Board do not object to the journey of the dog being broken by its detention at some suitable place for one night, provided that it is kept apart from all other dogs, and that the journey is thereafter completed with reasonable dispatch.

13. The license should be retained by the person in charge of the dog who is responsible for compliance with the conditions prescribed in the license. The license must be returned to the Board at the end of the period of detention, or at once if it is not made use of.

14. The dog cannot in any case be moved from the place of detention to other premises in the United Kingdom without a further license from the Board. Where the Board are satisfied that exceptional circumstances have arisen which render the removal of a dog detained under a license, Form B, necessary or expedient, they are prepared to consider an application for a removal license, provided it is not proposed to remove the dog from a rural to an urban district, or from the original premises to a less suitable place of detention. Unless the dog is to be taken from the private residence of the owner to another house in his occupation, the premises of an experienced veterinary surgeon should be specified as the place of detention, and the removal cannot be authorized unless the dog can be detained at the second address for the remainder of the period of detention.

15. Where satisfactory arrangements of the character above indicated cannot be made by the owner, the dog must be detained at the premises first specified, or removed to such place as the Board may direct.

16. During the period of detention under a license, Form B, the dog, when temporarily moved for exercise as provided in the license, must be properly muzzled with a wire cage muzzle, and in charge of a competent person, and the former condition is also applicable when the dog is likely at any time to be brought into contact with other dogs.

17. Should a dog die, or be lost, whilst under detention, the fact should be at once reported to the Board, together with full information as to the symptoms preceding death, or the circumstances in which the loss took place. In the event of the dog sickening with any of the symptoms of rabies, it should be at once isolated, and the advice of a veterinary surgeon obtained.

18. A dog detained under a license of the Board cannot be moved to a vessel for exportation without a further license of the Board.

19. Licenses are issued by the Board to land performing dogs, if it can be shown that the dogs have been trained to take part in performances for the entertainment of the public, and that they are to be imported for that purpose only, and that they are under an actual engagement to perform immediately on arrival. These licenses require that during a period of 90 days dogs so admitted shall be isolated from contact with all other dogs, that they shall not be taken into any public place unless properly muzzled in the manner set out in the license, and that during that period the Board shall at all times be kept informed of the premises upon which the dogs are detained. Satisfactory evidence must also be afforded that the animals are habitually kept apart from all other dogs, whether in this country or abroad.

20. For the convenience of persons passing through Great Britain the Board are prepared, in special cases, to issue licenses for the landing of dogs to be exported within a very few days. Applications for such licenses should specify the ports, the names of the vessels, the dates of their arrival and departure, and the address of some suitable place where the dog can be detained during the period that it remains in Great Britain. The license in this case should be endorsed by an officer of the vessel of departure, and returned to the Board by the owner. The dog cannot again be landed in Great Britain without a further license.

21. The experience of the Board has clearly shown that the frequent movement of pet dogs to and from the Continent involves this country in serious danger, inasmuch as a pet dog may become infected with rabies without the knowledge and despite the utmost care on the part of its owner. It is therefore a matter of great importance to owners of dogs in Great Britain that dogs from abroad should only be admitted in instances where it has been satisfactorily established that some useful purpose will be served by their admission, or where a pet dog would otherwise be separated from its owner for a prolonged period. Pet dogs should not be taken abroad and thus exposed to the risk of infection, except in cases of real necessity.

22. The Board earnestly invite the cordial co-operation of dog owners in carrying out regulations which have been designed with a view to minimize the risk of reintroducing a very terrible disease.

T. H. ELLIOTT,
Secretary.

Board of Agriculture,
4, Whitehall Place,
London, S.W.,
August 8, 1900.

Copies of this Memorandum may be obtained on application to the Secretary of the Board of Agriculture at the above address.

INDEX TO APPENDICES

QUARANTINE AND PUBLIC HEALTH.

PAGE.

No. 1. Report of the Director General of Public Health....F. Montizambert, M.D., Edin., F.R.C.S., D.C.L., &c., &c.

Bubonic Plague..... 3
Prophylactic and Curative Serums..... 9
Viability of the Plague Bacillus..... 11
Small-pox..... 12
The Germ of Small-pox..... 16
Asiatic Cholera..... 17
Yellow Fever..... 17
Beri-beri..... 20
Inoculation Against Enteric Fever..... 20
Tuberculosis..... 21
British Congress on Tuberculosis..... 24
Hydrocyanic Acid in Public Health Work..... 31
Disinfection at the Port of Departure..... 32
National Hygienic Laboratories..... 32
Congresses and Meetings..... 33
The Quarantine Stations..... 33
Grosse Isle, Que..... 33
William Head, B.C..... 33
Victoria, B.C..... 34
Vancouver, B.C..... 34
Halifax, N.S..... 34
St. John, N.B..... 34
Sydney, C.B..... 34
Charlottetown, P.E.I..... 34
Chatham, N.B..... 34
Extra Ports and Places..... 34
The Territories..... 34
Public Works Health Act..... 35
Leper Lazaretto, Tracadie, N.B..... 35

2. Report on St. Lawrence Quarantine.....G. E. Martineau, M.D..... 36
Small-pox..... 36
Bubonic Plague..... 37
Improvements and Requirements..... 37

3. Report on Halifax, N.S., Quarantine Station....N. E. Mackay, M.D..... 38

4. " North Sydney, N.S., Quarantine Station....H. Rindress, M.D..... 41

PAGE.

5. Report on St. John, N.B., Quarantine Station....J. E. March, M.D.. 42
6. " Chatham, N B., Quarantine Station.....J. Macdonald, M.D..... 43
7. " Charlottetown, P.E.I., Quarantine Stn....P. Conroy, M.D.. 44
8. " William Head, B.C., Quarantine Station....A. T. Watt, M.D.... 45
9. " Bacteriological work at William Head, B.C..W. H. K. Anderson, B.A., M.B.. 50
10. Report of Victoria, B.C., Quarantine Officer.....R. L. Fraser, M.D.. 51
11. " Vancouver, B.C., Quarantine Officer.....L. N. MacKechnie, M.D.. 51
12. " Physician to the Leper Lazaretto, Tracadie, N. B.... ....A. C. Smith, M.D..... 53
13. " The Public Works Health Inspector.....C. A. L. Fisher.. 53

CATTLE QUARANTINE.

14. Report of the Chief Veterinary Inspector .....Prof. D. McEachran,. F.R.C.V.S., V.S. Edin., D.V.S., &c., &c..... 53
Exportation of Live Stock from Maritime Ports..... 64
Stockers..... 66
Importations of Live Stock..... 66
Horse Raising in Canada..... 67
Glanders... 69
Bulletin on Glanders..... 70
Malarial or Swamp Fever in Horses..... 73
Mange in Cattle..... 74
Actinomycosis..... 76
Hog Cholera..... 76
Pictou Cattle Disease..... 77
Inspection of Stock Yards and Cars..... 77
Sheep Scab.... 77
Anthrax and Symptomatic Anthrax..... 78
Bulletin on Anthrax, &c..... 79
Tuberculosis..... 82
British Congress on Tuberculosis..... 83
Prof. Robt. Koch's Paper..... 85
Prof. McFadyean's Paper..... 88
Prof. McEachran's Paper—Legislation Suggested, &c..... 91
Circular *re* Tuberculin Testing..... 102
The Cattle Quarantine System of Canada..... 104
Point Lévis Cattle Quarantine..... 107
Enzootic Fistulous Withers and Poll Evil in Horses..... 109
15. Report by Professor J. George Adami, M.A., M.D., F.R.S.E., &c., &c.... 110
Experimental Work at Outremont..... 110
Relationship Between Human and Bovine Tuberculosis..... 113
British Congress on Tuberculosis.... 113
Prof. Koch's Address at British Congress on Tuberculosis..... 116
Transmissibility of Tuberculosis from Man to Cattle.... 119
Transmissibility of Bovine Tuberculosis to Man.... 121
Transmission of Tuberculosis from Cattle to Man.... 122
On the Frequency of Such Transmission..... 122
Summary.... 127
Pictou Cattle Disease..... 129

PAGE.

No. 16. Report by Charles H. Higgins, B.S., D.V.S..... 136
Experimental Work at Outremont..... 136
Sterility of Tuberculin..... 136
Celloidin Capsules..... 137
Immunity to Tuberculin by Repeated Tests..... 138
Cohabitation..... 141
Culture Media..... 141
Typhoid bacilli..... 141
Anthrax in Sheep in North-west Territories..... 142
Microscopic Examinations..... 143
Tuberculin Testing..... 143
17. Report by Professor M. C. Baker, D.V.S..... 144
18. " Charles McEachran, D.V.S..... 145
19. " B. A. Sugden, D.V.S..... 145
20. " A. E. Moore, D.V.S..... 146
21. Report on Point Levis Cattle Quarantine Station....J. A. Couture, D.V.S..... 148
22. " St. John Cattle Quarantine Station.....J. H. Frink, D.V.S..... 149
23. " Halifax Cattle Quarantine Station.....Wm. Jakeman, D.V.S..... 150
24. " Health of Live Stock in Ontario.....Prof. Andrew Smith, F.R.C.V.S.. 151
25. " Point Edward Cattle Quarantine Station....Arthur Brown, D.V.S..... 152
26. Report of Veterinary Inspector at Niagara Falls, O..S. E. Boulter, V.S..... 153
27. " Veterinary Inspector at Bedeque, P.E.I....W. H. Pethick, V.S..... 154
28. " Veterinary Inspector at Winnipeg, Man....Chas. Little, V.S..... 155
29. Report of the Commissioner of the North-west Mounted Police.....A. Bowen Perry..... 156
Horses..... 156
Cattle..... 157
Sheep..... 158
Horses..... 158
General Remarks..... 159
30. Report of Veterinary Inspector at Nelson, B.C.....J. A. Armstrong, V.S..... 160
31. " Veterinary Inspector at Grand Forks, B.C..... S. C. Richards, V.S..... 161
32. " Veterinary Inspector at Vancover, B.C....J. B. Hart, V.S..... 161
33. " Veterinary Inspector at Victoria, B.C....S. F. Tolmie, V.S..... 162
34. Report on Pictou Cattle Disease in Nova Scotia.....Geo. Townsend, V.S..... 163
35. " Live Stock Cars and Yards.....Michel Auger..... 164
36. " Testing Cattle in Great Britain for exportation to Canada.....J. G. Rutherford, V.S..... 165
37. Importation of Dogs into Great Britain..... 167

Scenes on Central Experimental Farm, Ottawa.

1. Elm leaved Spiraea.
2. Peach leaved Campanula.
3. Office building and Laboratory with surrounding plantation.
4. Part of Lilac group in Arboretum.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, LL.D.
AGRICULTURIST	J. H. GRISDALE, B. AGR.
HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
ENTOMOLOGIST AND BOTANIST	JAS. FLETCHER, LL.D.
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, NAPPAN, N.S.	R. ROBERTSON
HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, BRANDON, MAN.	S. A. BEDFORD
" " " INDIAN HEAD, N.W.T.	ANGUS MACKAY
" " " AGASSIZ, B.C.	THOS. A. SHARPE

FOR

1901

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1902

[No. 16—1902]

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, December 1, 1901.

SIR,—I beg to submit for your approval the fifteenth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended, reports from the following officers of the Central Experimental Farm: From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun; from the Chemist, Mr. Frank T. Shutt, and from the Entomologist and Botanist, Dr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr. R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba, at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms; also of scientific investigations in the chemical laboratory and the information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms is a gratifying evidence of the desire for information among this class of the community, also of the high esteem in which these records of the work of the farms are held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,

Your obedient servant,

WM. SAUNDERS,

Director Experimental Farms

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR, WM. SAUNDERS, LL.D., F.R.S.C., F.L.S.

The year 1901 has, on the whole, been an encouraging one for Canadian farmers. While some crops in Ontario, Quebec and the maritime provinces have fallen below the average yield, others have been unusually good, and the excellent prices received for nearly all farm products during the year have helped to make up for any shortage in particular crops. In Ontario, fall wheat, oats and pease have given yields unusually light, while hay, which occupies a nearly equal area, has given a remarkably heavy return, and the product has been of good quality. Hay has also given exceptionally large crops in Quebec and the maritime provinces, in which sections, however, oats have fallen below the average. Spring wheat and barley are said to have produced nearly average returns in the eastern provinces, while Indian corn and field roots have gone above the average.

In the western provinces of Manitoba and British Columbia, agricultural crops of all sorts have been very good, while in many parts of the North-west Territories the yields have been extraordinary and probably unprecedented.

The experimental farms have had results corresponding much with those of the best farmers in their neighbourhood, and on the whole, as will be seen by consulting the following pages, the returns have been very encouraging. The Fifteenth Annual Report of the work of these institutions is herewith presented. The reports previously issued, one of which has appeared annually for the last fourteen years,—covering practical experimental work to determine many points along all the different lines embraced in Canadian agriculture, horticulture, forestry and ornamental planting—have had a wide influence in moulding the thought and practice of a large number of the more intelligent people engaged in these various branches of work, and through them, have wielded an influence on others. Object lessons, framed after the best methods, and covering a very large field, have been provided every year at each of the experimental farms, and visiting farmers who have come to learn, as many of them annually do, have carried home with them useful ideas, which, put in practice on their own farms, have added to the profits of their business.

Those who are so situated that they cannot visit the farms, can receive free, by asking for them, the annual reports and the bulletins prepared by the officers of the farms, replete with information covering, as fully as is practicable, many of the different lines of work undertaken, and the results can be studied at leisure. Thus, the information acquired is spread over the whole Dominion. Nearly fifty thousand farmers now receive the publications of the experimental farms, and their number is steadily increasing.

The experimental farms were among the first agencies provided for the special purpose of aiding Canadian farmers in the solution of the many difficulties which surround their calling in the various climates of the Dominion, and the progress which has been made in all branches of this national industry owes, no doubt, much to the more general adoption of the sound principles governing good farming, which have been persistently advocated on every occasion by the officers of these institutions. The many problems associated with the thorough preparation of the soil, and the best methods to adopt to maintain its fertility, have been carefully investigated and reported on. The great importance of selecting the most productive sorts of seed has been repeatedly urged and tangible proofs offered of the success attending such practice. To encourage and assist farmers in their endeavours along this line, varieties of wheat, oats, barley, and pease of established value have been grown in considerable quantities on the experimental farms for the past 12 or 13 years, and distributed in sample bags, free, by mail, to all farmers who apply for them. The demand for these samples has been so great that it has been found necessary to limit the number sent, to one only to each applicant. For the past six years more than thirty thousand farmers have participated annually in these co-operative experiments, which have involved the free distribution, through the mail, of over sixty tons of seed each season. The liberal provision thus made for Canadian farmers by the Dominion government has been of very great benefit, and there are now, as a result of this work, many of these high class productive sorts of grain under cultivation in almost every settled locality throughout the Dominion. In addition to the actual gain resulting from the general introduction of more profitable sorts of grain, this work has had a wide educational influence. Farmers have learned to observe the characteristic variations in varieties and their powers of observation and comparison, thus awakened, have been brought to bear on other problems in their calling, to their individual advantage and profit. The cultivation of these good sorts by the more enterprising farmers has interested their neighbours, who have benefited in turn, and hence the good influences attending this useful work are extending through all sections of the farming community.

Some other branches of special work which have been under my personal charge have also made considerable progress. The experiments conducted in the cross-breeding of commercial apples and hardy Siberian crabs, with the object of producing very hardy apple trees, such as are likely to be adapted to the climates of our north-west country (where ordinary sorts do not grow), have been successfully continued. Several new varieties have fruited during the past year, which promise to be of value. Some very interesting new crosses in wheat have also been produced. A large number of samples of grain has been tested for vitality, received from farmers in different parts of the country. Some particulars relating to these tests, and the number of them, will be found at a subsequent page in the report from Mr. W. T. Ellis, who has charge of this branch of the work.

Many desirable additions have been made to the collection of ornamental trees and shrubs on the grounds surrounding the buildings on the Central Experimental Farm, which have thus been made additionally attractive and instructive to visitors.

The accompanying report will be found to contain a large amount of practical information, such as is likely to be helpful to all those who are engaged in Canada's great national industry, agriculture.

EXPERIMENTAL WORK

CONDUCTED AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, ONTARIO.

EXPERIMENTS WITH OATS.

One hundred and seven varieties of oats have been under trial in the test plots at the Central Experimental Farm during 1901. The object of these experiments has been to gain information as to the relative productiveness, earliness and other characteristics of the different sorts. The soil on which these oats were sown was a heavy sandy loam of good quality, more or less mixed with clay. The previous crop was field roots. The land received a dressing in the winter of 1899-1900 of about twelve tons of fresh barn-yard manure per acre, which was placed on the frozen ground in small heaps of about one-third of a cart load each, and spread and ploughed under in the spring. No manure has been applied since. In the autumn of 1900, after the roots were gathered, the land was ploughed about seven inches deep and left in that condition until the following spring when it was cultivated twice with a two-horse cultivator and harrowed twice with the smoothing harrow before the oats were sown.

The seed of most of the varieties was sown on April 17, the remainder from April 26 to 29 all on plots of one-fortieth of an acre each, seed being used in each case at the rate of two bushels per acre.

Among the new sorts brought under trial are Irish Victor, Beseler and Atlantic, all white branching oats. Pioneer, a black branching oat, and Goldfinder, a large yellow half-sided oat, both new introductions of the Garton Bros., of Newton-le-Willows, England. To Prof. C. Doxrud, of the Technical School, Christiania, Norway, I am indebted for two varieties of oats from that country. Black No. 6 and Summer No. 5, and from the United States Department of Agriculture I have also received two new sorts, Tobolsk 2800, and Zhelanni 2963.

Included in the list there are also thirteen cross-bred sorts, all of which have been originated on the experimental farms:—Brandon, Cromwell, Holland, Kendal, King, Master, Medal, Milford, Miller, Olive, Oxford, Pense and Russell.

There are also two new cross-bred sorts in the list this year. These are further results of the work in cross-breeding done by Dr. A. P. Saunders, at Brandon, in 1892. The following are their names and parentage:—

Dixon.—Black Tartarian female, with Early Gothland male.

Forbes.—Giant Cluster female, with Prize Cluster male.

It will be seen from the following results that oats have fallen below the average in yield this year.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
1	Liberty	Aug. 8	102	51—53	Stiff	8½— 9½	Branching	64	24	33	Considerably.
2	Virginia White Abundance	July 28	94	50—52	"	9 —10	"	60	—	37½	Slightly.
3	Cromwell	" 25	100	49—51	"	10 —11	Half sided	58	8	36½	Considerably.
4	Uberfluss	" 28	103	50—52	"	9 —10	Branching	57	2	31	Slightly.
5	Joanette	" 28	103	35—37	"	8 — 9	"	57	2	36¼	"
6	Columbus	" 26	101	39—41	"	8 — 9	"	57	2	35	"
7	Milford, Black	" 31	96	49—51	"	10 —11	Half sided	57	2	33	Badly.
8	Doncaster Prize	" 29	94	51—53	Weak	9 —10	Branching	57	2	31	"
9	Kendal, White	Aug. 4	100	49—51	Stiff	8½— 9½	Half sided	55	30	33	Considerably.
10	Early Maine	July 25	100	49—42	"	11 —12	Branching	55	10	33½	Slightly.
11	American Triumph	" 25	100	39—41	"	8 — 9	"	54	24	33	Considerably.
12	Lincoln	" 25	100	38—40	"	8¾— 9½	"	54	24	35	"
13	Improved American	" 25	100	40—42	"	8 — 9	"	54	24	33	"
14	Olive, Black	" 31	96	51—53	Medium	9 —10	Half sided	54	24	33	Badly.
15	Mennonite	" 23	98	37—39	Stiff	7 — 8	Branching	54	24	31	Considerably.
16	Eureka	" 31	96	54—56	Medium	9 —10	"	53	18	30	"
17	Black Beauty	" 20	95	41—43	Stiff	10 —11	"	53	18	32½	Slightly.
18	Rennie's Prize White	Aug. 2	96	55—57	Weak	9 —10	"	52	32	34	Badly.
19	Milford, White	July 31	96	50—52	Stiff	10 —11	Half sided	52	12	34	"
20	Oxford	" 25	100	45—47	"	9 —10	"	51	26	37½	Considerably.
21	Abundance	" 25	100	41—43	"	9½—10	Branching	51	6	33½	Slightly.
22	Olive, White	" 31	96	53—55	"	8 — 9	Half sided	50	—	33½	Considerably.
23	Pense, Black	" 31	96	52—54	"	9 —10½	"	50	—	32	Badly.
24	California Prolific B.	" 28	103	40—42	"	7½— 8½	Sided	50	—	32	Slightly.
25	Prolific Blk. Tartar'n	" 28	103	40—42	"	8 — 9	"	48	28	34	"
26	Leutewitzer	" 29	94	50—52	Weak	9 —10½	Branching	48	28	30	Considerably.
27	Banner	" 25	100	41—43	Stiff	9½—10½	"	48	28	33	Slightly.
28	Anderbecker	Aug. 2	98	55—57	Medium	9 —10	"	48	28	31½	Considerably.
29	King	July 25	100	39—41	Stiff	9½—10½	"	48	28	36½	Slightly.
30	Holstein Prolific	" 25	100	41—43	"	9 —10	"	48	28	36	"
31	American Beauty	" 23	98	39—41	"	8 — 9½	"	48	8	37	"
32	Irish Victor	" 25	100	39—41	"	8 — 9	"	48	8	35	"
33	Aitken, Black	" 28	103	44—46	"	10½—11	"	48	8	34½	"
34	Selchower	" 29	94	58—60	Weak	10 —11	Sided	48	8	33	Badly.
35	Pense, White	" 31	96	57—59	Stiff	9 —10½	Half sided	47	22	34	"
36	Sensation	" 25	100	44—46	"	8 — 9	Branching	47	22	37½	Considerably.
37	Cream Egyptian	" 25	100	39—40	"	8 — 9½	Half sided	47	22	37	"
38	Thousand Dollar	" 23	98	42—44	"	8½— 9½	Branching	47	22	35	Slightly.
39	Russell	" 25	100	41—43	"	9 —10	"	47	22	34½	"
40	Poland	" 29	94	58—60	Weak	9 —10½	"	47	22	36	Badly.
41	Rosedale	" 28	103	43—45	Medium	8 — 9	Half sided	47	2	37½	Considerably.
42	Salzer's Big Four	" 23	98	39—41	"	10 —11	Branching	47	2	32½	"
43	Hazlett's Seizure	" 25	100	41—43	Stiff	8 — 9½	"	46	16	34	Slightly.
44	Master	" 28	103	46—48	"	9½—10	Half sided	46	16	35½	"
45	White Schonen	" 25	100	41—43	"	8 — 9	Branching	46	16	34½	"
46	Bestehorn's Abundance	Aug. 8	102	40—42	"	7 — 8½	"	45	30	34⅔	"
47	Buckbee's Illinois	July 25	100	44—46	"	8 — 9	"	45	10	38½	Considerably
48	Golden Beauty	" 25	100	42—44	Medium	8 — 9½	"	45	10	33½	Slightly.
49	Blk. Tartarian Imp.	" 28	103	40—42	Stiff	8½— 9	Sided	45	10	35	"
50	Tobolsk No. 2800	" 29	104	42—44	"	9 —10	Branching	44	4	36½	Considerably.
51	Oderbruch	" 28	103	44—46	"	9 —10½	Half sided	44	4	35½	"
52	Danish Island	July 26	101	40—42	Stiff	9 —10½	Branching	44	4	31½	Considerably
53	White Giant	" 26	101	43—45	"	9 —10	"	44	4	31	Slightly.
54	Newmarket	" 25	100	41—43	"	8½— 9½	"	44	4	37	"
55	Improved Ligowo	" 23	98	39—41	Medium	8 — 9½	"	44	4	37	Badly.
56	Early Dawson	" 26	91	50—52	Weak	10 —11	"	44	4	32½	Considerably.
57	Early Gothland	" 26	101	43—45	Stiff	9 — 10	Half Sided	44	4	37½	Slightly.
58	Victoria Prize	" 25	90	46—48	Weak	10½—11¼	Branching	43	18	36	Considerably.
59	New Zealand	Aug. 7	113	44—46	Stiff	9 —10½	Sided	42	12	34½	"
60	Dixon	" 8	102	41—43	"	9 —10	"	42	12	35½	Slightly.
61	Wide Awake	July 25	100	38—40	"	8 — 9½	Branching	41	26	34½	"
62	Holland	" 28	103	38—40	"	9 —10½	Sided	41	26	33	"

OATS—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
63	Pioneer	July 25	100	34—36	Stiff	9 —10	Branching	41	26	35	Considerably.
64	Early Blossom	" 28	103	41—43	"	8 — 9½	Half Sided	41	26	30½	"
65	Beseler	Aug. 10	104	45—47	"	9½—10½	Branching	41	26	35½	Badly.
66	Black No. 6 Summer	" 8	105	47—49	"	9 —10½	Sided	41	6	32	"
67	Scottish Chief	" 2	96	43—45	"	11 —12	Branching	41	6	38	Slight'y.
68	Bavarian	July 25	100	42—44	"	10 —11	"	40	20	34	"
69	Abyssinia	" 28	103	39—41	"	9 —10	Half Sided	40	20	34	Considerably.
70	Wallis	" 23	98	37—39	"	8 — 9½	Branching	40	20	37½	Slightly.
71	Winter Grey	" 26	91	53—55	Weak	10 —11	"	40	20	31½	Badly.
72	Salines	" 29	104	42—44	Stiff	10 —11½	"	40	20	33	Considerably.
73	Australian	Aug. 2	108	43—45	"	9 —10	Sided	40	20	31	"
74	Flying Scotchman	July 22	97	45—47	"	9½—10½	Branching	40	..	33	"
75	Goldfinder	" 28	103	42—44	"	9 —10	Half Sided	39	14	31	Slightly.
76	Mortgage Lifter	" 28	93	50—52	Weak	9 —10½	Branching	39	14	36½	"
77	Miller	" 31	106	42—44	Stiff	8 — 9	"	39	14	34½	"
78	Sargentfree	Aug. 2	96	42—44	"	8 — 9½	"	38	28	37½	"
79	Probstey	" 8	102	42—44	"	7 — 8½	"	38	28	35	Considerably.
80	Imported Irish	July 25	100	40—42	"	9 —10	"	38	8	37½	Slightly.
81	Black Mesdag	" 20	95	41—43	"	10 —12	"	37	22	31½	"
82	Forbes	Aug. 8	102	40—42	"	8 — 9	Sided	37	22	30	Considerably.
83	Atlantic	" 7	101	43—45	"	8½— 9½	Branching	37	22	36¾	Badly.
84	Brandon	July 28	103	45—47	"	10 — 11	Half Sided	37	2	32½	Slightly.
85	White Russian	" 25	100	41—43	"	8 — 9	Branching	37	2	35	Considerably.
86	Russell Half Sided	Aug. 2	96	42—44	"	10 —11	Half Sided	36	16	36	Slightly.
87	Kendal Black	" 6	102	51—53	"	8½— 9½	"	36	16	34	Badly.
88	White Wonder	July 23	88	40—42	"	9 —10	Branching	35	30	36½	Slightly.
89	Bayonet	" 26	91	43—45	"	10 —11	"	35	30	36½	"
90	Great Northern	" 31	96	39—41	"	8 — 9	"	35	30	32	Considerably.
91	Siberian	" 28	103	43—45	"	8 — 9	"	34	24	34	Slightly.
92	Bonanza	" 22	97	44—46	Medium	10 —11½	"	33	18	36½	Badly.
93	Coulommiers	Aug. 2	108	43—45	Stiff	10 —11	"	33	18	35½	Considerably.
94	Welcome	July 23	88	39—41	Medium	9 —10½	"	32	32	36½	Slightly.
95	Swedish Select No. 2788	" 29	104	38—40	Stiff	7 — 8½	"	32	32	35½	Considerably.
96	Russell Branching	Aug. 8	102	36—38	Medium	8 — 9	"	32	32	37½	Slightly.
97	Golden Giant	July 28	103	40—42	"	9 —10	Sided	32	12	31	"
98	Early Archangel	" 23	98	37—39	"	9 —10½	Branching	32	12	37	Badly.
99	Early Golden Prolific	" 25	100	36—38	Stiff	8 — 9	"	32	12	31	Slightly.
100	Golden Tartarian	" 31	106	38—40	"	9 —10	Sided	31	6	30	Considerably.
101	Tartar King	" 23	98	39—41	"	9 —10½	"	31	6	32	Badly.
102	Duppauer Summer, No. 5	Aug. 6	103	46—48	"	9 —10	Branching	81	6	33	Considerably.
103	Waverley	July 25	100	40—42	"	7 — 8	"	30	..	34½	Slightly.
104	Longhoughton	" 28	103	30—32	Medium	9 —10	"	20	20	33½	"
105	Scotch Potato Imp., 1901	" 28	103	32—34	"	8 — 9½	"	20	20	35½	Badly.
106	Medal	Aug 7	103	44—46	"	10 —11	Half Sided	19	14	32	"
107	Zhelanni, No. 2963	July 29	104	46—48	Weak	11 —12½	Branching	18	28	33½	Slightly.

SELECT LIST OF OATS.

Seven years ago a system of uniform trial plots was planned to be conducted at all the experimental farms, which provided for the growing of the promising sorts of the most important agricultural crops side by side, on similar soil and all of the same class being sown on the same day so that the conditions might be uniform. The results have been published each year since in an annual crop bulletin which has been issued as early in the season as practicable. After three years of trial the average yields for that period obtained at all the experimental farms was published in the bulletin for

1897 (No. 29). Similar results with added experience have been published in the annual crop bulletin each year since, the results for the seventh year, 1901, having recently appeared in bulletin No. 39. In these bulletins the six or twelve sorts found most productive on each farm have been specially noted. All those varieties which during five years' trial do not find their way at any time into these lists of the best sorts at any of the experimental farms are dropped from the list at the end of that period to make room for other new and promising kinds. Occasionally where a variety of grain shows some radical defect, such as persistent weakness of straw, it is discarded after a shorter trial. By this method the lists are kept within reasonable limits.

The following sorts of oats have been thus dropped during the past two or three years:—Coulommier's, Doncaster Prize, Early Dawson, Early Etampes, Imported Irish, Medal, Mortgage Lifter, Poland, Prize Cluster, Rennie's Prize, Scotch Hopetoun, Welcome, White Monarch, White Wonder, Winter Grey. Some of the varieties so discarded from the uniform trial plots are still continued in the general list grown at some of the experimental farms in the discretion of the superintendent.

In the following list of oats the average yield per acre at all the experimental farms is given of all the varieties which have been under trial for three years or over. The periods reported on range from three to seven years.

SELECT LIST OF VARIETIES OF OATS.

Number.	Names of Varieties.	Kind of Head.	Colour of Grain.	Number of Years under test.	Average yield per acre at all the Experimental Farms.	
					Bush.	Lbs.
1	Banner	Branching	White	7	76	14
2	American Beauty	"	Yellow	7	75	33
3	Mennonite	"	"	6	75	23
4	Danish Island	"	White	4	75	21
5	New Zealand	Sided	"	3	75	19
6	Black Beauty	Branching	Black	5	74	3
7	Improved American	"	White	5	73	29
8	White Giant	"	"	4	73	5
9	Thousand Dollar	"	"	4	73	1
10	Holstein Prolific	"	"	7	72	31
11	Bavarian	"	"	7	72	21
12	Buckbee's Illinois	"	"	6	72	4
13	Golden Beauty	"	Yellow	7	71	32
14	Salines	"	"	3	71	27
15	Columbus	"	"	7	71	17
16	Golden Giant	Sided	"	7	71	8
17	Early Golden Prolific	Branching	White	7	71	—
18	Abundance	"	"	7	70	20
19	American Triumph	"	"	7	70	20
20	Kendal	Half sided	Black	3	70	18
21	Lincoln	Branching	White	7	70	16
22	Golden Tartarian	Sided	Yellow	5	70	8
23	White Schonen	Branching	White	7	69	31
24	Oderbruch	Half sided	"	7	69	25
25	Siberian	Branching	"	5	69	22
26	Wallis	"	"	7	69	14
27	Holland	Sided	Yellow	4	69	1
28	Wide Awake	Branching	White	7	68	32
29	Early Blossom	Half sided	"	7	68	13
30	Early Gothland	"	"	7	68	1
31	Improved Ligowo	Branching	"	7	67	18
32	Olive	Half sided	Black	6	67	15
33	Early Maine	Branching	White	7	67	6
34	California Prolific Black	Sided	Black	7	67	3
35	White Russian	Branching	White	7	67	2
36	Hazlett's Seizure	"	"	7	66	20
37	Early Archangel	"	"	7	66	16

SELECT LIST OF OATS—*Concluded.*

Number.	Names of Varieties.	Kind of Head.	Colour of Grain.	Number of Years under test.	Average yield per acre at all the Experimental Farms.	
					Bush.	Lbs.
38	Milford	Half sided	Black	3	65	23
39	Joanette	Branching	"	7	65	18
40	Newmarket	"	White	5	65	16
41	Cromwell	Half sided	Yellow	6	65	5
42	Abyssinia	"	White	7	65	3
43	Miller	Branching	"	6	64	25
44	Rosedale	Half sided	"	7	64	21
45	Pense	"	Black	6	64	15
46	Prolific Black Tartarian	Sided	"	7	64	10
47	King	Branching	White	5	64	2
48	Russell	Half branching	Yellow	6	63	29
49	Flying Scotchman	Branching	White	7	63	16
50	Master	Half sided	Yellow	6	62	21
51	Oxford	"	White	6	62	10
52	Cream Egyptian	"	"	7	61	33
53	Bonanza	Branching	"	7	61	26
54	Brandon	Half sided	Yellow	6	61	25
55	Black Mesdag	Branching	Black	4	60	22

EXPERIMENTS WITH BARLEY.

Sixty-seven different sorts of barley have been under test at the Central Experimental Farm during 1901. Thirty of these have been two-rowed sorts, and thirty-seven six-rowed. The land on which the barley was sown, adjoined that used for oats, and was of the same character and quality and had similar manuring and preparation. The size of the plots was one-fortieth of an acre each. The two-rowed sorts were sown at the rate of two bushels per acre, and the six-rowed at the rate of one and three-quarter bushels per acre. The seed of nearly all these varieties of barley, both two-rowed and six-rowed was obtained from selected heads picked by hand, the largest and plumpest being chosen.

Among the two-rowed sorts there are six new varieties this year. Oregon received from the United States, Bestehorn's Kaiser and Fitchel Mountain from Germany, Plumage from Norway and Standwell and Invincible, two varieties recently introduced by the Garton Bros., Newton-le-Willows, England. In this group are also included the following seventeen hybrid sorts, all of which have been produced at the experimental farms. Beaver, Bolton, Clifford, Dunham, Fulton, Gordon, Harvey, Jarvis, Leslie, Logan, Monck, Nepean, Pacer, Pelham, Rigid, Sidney and Victor.

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	French Chevalier	July 25	99	41—43	Medium	3½—4	55	10	51½	No rust.
2	Danish Chevalier	" 28	93	34—36	"	3½—4	47	4	52	"
3	Beaver	" 20	85	40—42	Stiff	2¼—3¾	46	2	50½	"
4	Canadian Thorpe	" 23	88	35—37	"	2½—3	45	10	50½	"
5	Standwell	" 23	88	35—37	Medium	2½—3	42	34	51½	"
6	Clifford	" 23	88	45—47	Stiff	3½—4	41	42	51½	"
7	Nepean	" 23	88	49—51	Medium	3½—3¾	41	2	51	"
8	Logan	" 23	88	43—45	"	4 —4½	39	18	50½	Slightly.
9	Kinver Chevalier	" 25	90	33—35	"	3½—4	36	22	50½	No rust.
10	Plumage from Norway	" 28	93	36—38	Stiff	3 —3½	34	28	51½	"
11	Gordon	" 20	85	42—44	"	2 —2½	33	46	50½	"
12	Jarvis	" 18	83	40—42	"	3 —3½	31	42	49	"
13	Sidney	" 22	87	47—49	Medium	4 —4½	31	22	51	"
14	Prize Prolific	" 28	93	31—33	Stiff	4 —4½	31	12	51½	"
15	Dunham	" 20	85	42—44	"	3 —3½	30	30	48¼	"
16	Invincible	" 28	93	30—32	"	2¾—3¼	29	28	52	"
17	Pacer	" 24	89	35—37	"	3½—4	26	42	49½	Slightly.
18	Pelham	Aug. 2	95	36—38	"	3½—4	26	12	51¼	"
19	Bolton	July 22	94	38—40	"	3 —3½	25	10	51	No rust.
20	Fichtel Mountain	Aug. 2	95	32—34	"	3½—4	22	4	50¾	Slightly.
21	Victor	July 23	88	36—39	"	3½—4	21	32	52	No rust.
22	Improved Thanet	Aug. 6	99	35—37	Medium	4 —4½	21	12	46	Considerably.
23	Bestehorn's Kaiser	" 8	101	36—38	Stiff	3 —3½	20	20	48¼	"
24	Fulton	July 25	90	38—40	"	2½—3	20	10	49	Slightly.
25	Oregon	Aug. 8	101	31—33	Weak	4 —4½	18	36	46	"
26	Duck-bill	" 8	96	25—27	Medium	2½—3	16	12	....	Considerably.
27	Harvey	July 25	97	35—37	Stiff	3 —3½	14	38	49½	No rust.
28	Monck	Aug. 6	99	40—42	"	3½—4	14	28	50½	Badly.
29	Rigid	" 8	101	32—34	"	3 —3½	14	28	49	Slightly.
30	Leslie	July 25	97	34—36	"	3½—4	11	2	50½	No rust.

SELECT LIST OF VARIETIES OF TWO-ROWED BARLEY.

In this list is given the average yield per acre obtained during the past three to seven years from the most productive varieties grown at all the experimental farms, with the length of time they have been under test. Only those are included which have been three years or longer under trial. Further particulars as to how these select lists have been worked up will be found under 'Select list of oats.'

Number.	Names of Varieties.	Number of Years under trial	Average yield per acre at all the Experimental Farms.		Number.	Names of Varieties.	Number of Years under trial	Average yield per acre at all the Experimental Farms.	
			Bush.	Lbs.				Bush.	Lbs.
1	French Chevalier	7	46	6	10	Nepean	6	42	7
2	Jarvis	3	45	7	11	Newton	7	42	3
3	Clifford	3	44	44	12	Fulton	3	41	21
4	Harvey	3	44	21	13	Leslie	4	41	20
5	Dunham	5	44	16	14	Bolton	7	41	19
6	Beaver	7	43	39	15	Sidney	7	41	16
7	Danish Chevalier	7	43	31	16	Prize Prolific	7	40	12
8	Canadian Thorpe	7	43	26	17	Kinver Chevalier	7	39	7
9	Logan	4	42	38	18	Victor	6	38	41

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs	
1	Odessa	April 19	July 18.	90	40—42	Stiff	3 —3½	41	2	50½	No rust.
2	Mensury	May 15	Aug. 6.	83	39—41	"	3 —3½	39	8	47⅞	Badly.
3	Stella	April 19	July 18.	90	36—38	"	3¼—3¾	36	42	52	No rust.
4	Claude	" 19	" 18.	90	38—40	"	2½—3	36	42	49½	"
5	Munro	May 3	" 22.	80	38—40	"	3 —3½	35	10	50	"
6	No. 8 from Norway	April 26	" 17.	82	42—44	Medium	2½—3	34	18	50½	"
7	Royal	" 19	" 18.	90	36—38	Stiff	3 —3½	33	26	50⅝	"
8	Nugent	" 19	" 18.	90	38—40	Medium	3 —3½	33	6	50½	"
9	Blue Long Head	" 26	" 24.	89	36—38	Stiff	2½—3	31	42	44½	"
10	Princess Sialof	May 3	Aug. 6.	95	34—36	Medium	3½—4	29	28	48½	Slightly.
11	Rennie's Improved	April 19	July 18.	90	38—40	Stiff	2 —2½	29	18	51	No rust.
12	Parkin	May 3	" 22.	80	37—39	"	2½—3	29	18	47	"
13	Petschora	April 19	" 17.	89	38—40	Medium	3 —3½	27	34	48	"
14	Pioneer	" 19	" 22.	94	38—40	Stiff	3 —3½	27	34	50	"
15	Vanguard	" 19	" 18.	90	38—40	"	3½—4	27	34	52	"
16	Beardless from Salzer	May 3	" 22.	80	38—40	"	2½—3	27	34	47	"
17	Albert	April 19	" 17.	89	36—38	Medium	2½—3	26	42	51½	"
18	Garfield	" 19	" 20.	92	38—40	Stiff	2½—3	26	22	49½	"
19	Yale	" 19	" 22.	94	38—40	"	3 —3½	26	2	49½	"
20	Odelbruch	" 19	" 20.	92	38—40	"	3 —3½	26	2	51	"
21	Lytton	" 19	" 23.	95	35—37	"	3¼—3¾	26	2	50	Slightly.
22	Common	" 19	" 17.	89	36—38	Medium	2½—3	26	2	50½	No rust.
23	Trooper	" 19	" 19.	91	38—40	Stiff	2½—3	25	10	51	"
24	Summit	" 19	" 18.	90	36—38	"	2½—3	25	10	51⅜	"
25	Phoenix	" 19	" 18.	90	38—40	"	2½—3¼	25	10	50½	"
26	Chinese Hulless	May 3	" 27.	85	23—25	"	2½—3	24	28	60½	"
27	Salzer's SilverKing	" 3	" 27.	85	29—31	"	2¾—3¼	24	28	47	"
28	Baxter	April 19	" 17.	89	36—38	Medium	2 —2½	24	18	51½	"
29	Hordeum Chousk (Hulless)	May 3	" 22.	80	22—24	"	3 —3½	23	26	57½	"
30	Empire	April 19	" 18.	90	39—41	Stiff	2½—3	22	34	52	"
31	Argyle	" 19	" 18.	90	37—39	"	2½—3	21	42	50	"
32	Brome	" 19	" 19.	91	36—38	Medium	2½—3	21	42	52½	"
33	Excelsior	" 19	" 19.	91	36—38	Stiff	3 —3½	17	34	48½	"
34	Success	May 17	Aug. 2.	77	29—31	"	2½—3	16	12	47	"
35	Sisolsk Spring No. 2962	April 17	July 22	96	37—39	"	3½—4	16	2	47½	"
36	Blue Short Head	May 3	Aug. 14	103	19—21	"	2 —2¾	11	12	41½	Badly.
37	Hulless Black	April 19	July 19.	91	27—29	Medium	2 —2½	9	38	62½	No rust.
38	Hulless White	" 19	" 22.	94	30—32	"	2 —2½	6	2	60½	"

Among the six-rowed barleys there are five new sorts this year. Princess Sialof from Germany. No. 8 from Norway, and Chinese Hulless, Hordeum Chousk and Sisolsk Spring, No. 2962, from the United States Department of Agriculture, Washington.

There are also included in the above list the following nineteen hybrid sorts, all of which have been produced at the experimental farms:—Albert, Argyle, Brome, Claude, Empire, Garfield, Lytton, Munro, Nugent, Parkin, Phœnix, Pioneer, Royal, Stella, Success, Summit, Trooper, Vanguard and Yale.

SELECT LIST OF VARIETIES OF SIX-ROWED BARLEY.

In this list is given the average yield per acre obtained during the past three to seven years from the most productive sorts grown at all the experimental farms, with the length of time they have been under test. Only those are included which have been three years or longer under trial. Particulars as to how these select lists have been made up will be found under 'Select list of oats.'

Number.	Names of Varieties.	Number of Years under trial.	Average yield per acre at all the Experimental Farms.	
			Bush.	Lbs.
1	Mensury	7	51	29
2	Claude	3	50	44
3	Mansfield	4	48	44
4	Odessa	7	48	19
5	Argyle	4	48	11
6	Yale	3	47	35
7	Trooper	7	47	4
8	Common	7	46	38
9	Royal	7	46	32
10	Oderbruch	7	45	35
11	Albert	3	45	28
12	Garfield	3	45	20
13	Baxter	7	45	3
14	Nugent	7	44	32
15	Petschora	7	44	3
16	Rennie's Improved	7	44	3
17	Summit	7	43	44
18	Stella	7	43	43
19	Bronce	3	43	40
20	Empire	4	43	12
21	Pioneer	7	42	45
22	Blue Long Head	5	42	38
23	Phœnix	7	42	22
24	Vanguard	7	42	20
25	Excelsior	6	42	15
26	Empire	7	42	5
27	Champion	6	42	4
28	Hulless Black	3	40	45
29	Success	7	38	42
30	Hulless White	3	37	30

EXPERIMENTS WITH FALL WHEAT.

Twenty varieties of fall wheat were under test during the past season. All but two were sown on September 7 on a piece of light, sandy loam, of good quality, on plots of one-fortieth of an acre each. The previous crop was rape, which was fed off early so as to permit of the land being worked well before sowing. It was ploughed from 6 to 7 inches deep, and well harrowed to bring it into a good condition of tilth. It was manured in the spring of 1900, before sowing the rape with about 20 tons of barn-yard manure per acre. The sowing of two of the varieties, Dawson's Golden Chaff and Surprise, was repeated on October 1, but it will be seen that the earlier sowings have produced the largest crops. All the varieties came through the winter well, and made a very strong and even growth and gave good returns. This grain was sown at the rate of $1\frac{3}{4}$ bushels of seed per acre.

FALL WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
1	Gold Coin	July 13	309	50—52	Medium.	2½—3	Beardless.	52	15	62	Slightly.
2	Dawson's Golden Chaff	" 13	309	53—55	Stiff	3—3½	"	49	30	62	"
3	Early Red Clawson	" 13	309	56—58	"	3—3½	"	49	2	60⅓	"
4	Reliable	" 13	309	54—56	Medium.	3—3½	Bearded.	47	12	63⅔	"
5	Jones' Winter Fife	" 15	311	54—56	Stiff	4—4½	Beardless.	45	50	62½	No rust.
6	Buda Pesth	" 13	309	46—48	"	2½—3	Bearded.	44	—	62⅔	"
7	Imperial Amber	" 17	313	52—54	Medium.	3½—4	"	44	—	61⅔	"
8	Golden Cross	" 15	311	50—52	"	2½—3	"	43	5	62¼	Slightly.
9	Surprise	" 13	309	48—50	Very stiff.	3—3½	Beardless.	42	10	61⅓	No rust.
10	Red Velvet Chaff	" 15	311	52—54	Stiff	3—3½	"	40	20	62½	Slightly.
11	Egyptian Amber	" 17	313	48—50	"	3—3½	Bearded.	40	20	62½	"
12	American Bronze	" 13	309	47—49	Very stiff.	3½—4	Beardless.	39	25	62⅔	"
13	Pride of Illinois	" 17	313	53—55	Stiff	3—3½	"	38	30	62½	"
14	Velvet Chaff	" 13	309	52—54	"	2½—3	Bearded.	38	30	62½	No rust.
15	Bonnell	" 13	309	54—56	"	3—3½	Beardless.	38	2	62	"
16	Poole	" 13	309	48—50	Medium.	2½—3	"	37	35	62½	"
17	Treadwell	" 17	313	50—52	"	3—3½	Bearded.	37	35	62	Slightly.
18	Tasmania Red	" 17	313	48—50	Weak	2—2½	"	34	22	62	No rust.
19	Turkey Red	" 17	313	45—47	"	2½—3	"	32	33	62½	"
20	Long Berry Red	" 13	309	46—48	Medium.	2½—3	"	32	5	63	"
21	Dawson's Golden Chaff	* " 17	313	45—47	Stiff	3—3½	Beardless.	35	20	....	"
22	Surprise	* " 17	313	41—43	"	3—3½	"	26	—	....	"

*Both these varieties were sown October 1st. It will be seen that the same varieties sown September 10th produced larger crops.

EXPERIMENTS WITH SPRING WHEAT.

One hundred and seventeen varieties of spring wheat were included in the trial plots in 1901. The soil was a mixed clay and sandy loam, in some parts the clay predominated, in others it was more sandy. The previous crop was field roots. The land received a dressing of fresh barn-yard manure, of about twelve tons per acre, during the winter of 1899-1900 which was put on the frozen ground in small heaps of about one-third of a cart load each and spread and ploughed under in the spring. No manure has been applied since. In the autumn of 1900 the roots were gathered, the land was ploughed about seven inches deep, and left in that condition until the following spring when it was cultivated twice with a two-horse cultivator and harrowed twice with the smoothing harrow before the wheat was sown.

The size of the plots was one-fortieth of an acre each, and they were all sown at the rate of one bushel and a half of seed per acre.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
1	Goose	Aug.	6	110	44—46 Stiff.	2 —2½	Bearded.	33	50	64½	No rust.
2	Hastings	July	28	101	44—46 "	3 —3½	Beardless.	33	50	60	"
3	Huron	"	31	104	46—48 "	3½—4	Bearded.	32	..	61	"
4	Herisson Bearded	Aug.	1	105	44—46 "	2 —2½	"	32	..	64½	"
5	White Fife	"	6	110	52—54 "	4 —4½	Beardless.	31	10	59	Slightly.
6	Beaudry	"	6	110	48—50 Medium.	3¾—4¼	Bearded.	29	50	61	"
7	No. 19, Australian	"	8	112	43—45 Stiff.	3¼—3¾	Beardless.	29	10	59	"
8	Red Fife	"	5	109	49—51 "	3½—4	"	29	10	59½	"
9	Hungarian	"	1	105	42—44 Medium.	3½—4	Bearded.	29	10	61	"
10	Preston	July	31	104	40—42 "	3½—4	"	28	40	58	No rust.
11	No. 181, Minnesota	Aug.	1	105	48—50 Stiff.	3 —3½	Beardless.	28	40	61½	"
12	Beauty	"	7	111	46—48 "	4 —4½	"	28	30	56½	Considerably.
13	No. 5642, Washington	"	8	104	44—46 Medium.	2¼—3	Bearded.	28	30	62	Slightly.
14	Dion's	"	7	111	46—48 Stiff.	4 —4½	"	27	50	60½	"
15	Campbell's White Chaff	"	2	106	50—52 "	3½—4	Beardless.	27	50	58	No rust.
16	Plumper	July	31	104	44—46 "	3½—4	Bearded.	27	20	63	Slightly.
17	No. 15, Australian	Aug.	11	104	46—48 "	2¾—3¼	Beardless.	27	10	60	Considerably.
18	Kingsford	"	5	98	41—46 "	3 —3½	"	27	10	59	Slightly.
19	No. 13, Australian	"	9	113	45—47 "	3½—4¼	"	27	10	59	Considerably.
20	No. 10, Australian	"	7	111	45—47 "	4 —4½	"	26	30	59	"
21	Clyde	July	31	104	48—50 "	4 —4½	"	26	30	60	No rust.
22	Crown	Aug.	1	105	40—42 "	3½—4	Bearded.	26	30	59½	"
23	Boyle	"	6	99	51—53 Medium.	3½—4	Beardless.	26	30	58½	Considerably.
24	No. 5644, Washington	"	7	105	40—42 Stiff.	1¾—2¼	Bearded.	26	30	63	Slightly.
25	Nixon	"	8	101	46—48 "	3½—4	Beardless.	26	30	60	"
26	No. 5639, Washington	"	8	104	42—44 "	2 —2¼	Bearded.	25	50	62	"
27	Perron (Les Eboulements)	"	6	99	45—47 "	3½—4	Beardless.	25	50	58	Considerably.
28	Old Red River	"	11	104	47—49 Medium.	3¾—4¾	"	25	10	60½	Badly.
29	Rio Grande	"	7	111	49—51 Stiff.	3¾—4½	Bearded.	25	10	61	Slightly.
30	Blenheim	"	1	105	41—43 Medium.	3½—4	"	24	40	60½	No rust.
31	Grant	"	8	101	44—46 Stiff.	3 —3½	Beardless.	24	30	60	Slightly.
32	No. 1, Australian	"	12	105	46—48 "	3¼—3¾	"	24	30	60	"
33	Emporium	"	9	103	49—51 Medium.	4 —4¼	Bearded.	24	10	60	Considerably.
34	Percy	July	31	104	46—48 Stiff.	4 —4½	Beardless.	24	..	60	No rust.
35	Chester	Aug.	1	105	39—41 "	3½—4	"	23	50	61	"
36	Tracey	"	11	104	49—51 "	3½—4¼	"	23	50	59	Considerably.
37	No. 169, Minnesota	"	2	106	42—44 "	3½—4	"	23	20	60	No rust.
38	Pringle's Champlain	July	31	104	41—43 "	3½—4	Bearded.	23	20	61½	"
39	No. 163, Minnesota	Aug.	2	106	42—41 "	3 —3½	Beardless.	23	20	59	"
40	Wellman's Fife	"	6	110	52—54 "	4 —4¾	"	23	10	59	Considerably.
41	No. 27, Australian	"	6	110	49—51 "	3¾—4¼	"	23	10	57	Slightly.
42	Steinmedal fr. Victoria, Aust	"	7	103	40—42 "	3 —3½	"	23	10	56	Considerably.
43	Cartier	"	1	105	40—42 "	3 —3½	Bearded.	23	10	60½	No rust.
44	Roumanian	"	7	111	42—44 "	3 —3½	"	23	10	63¼	Slightly.
45	Early Riga	July	21	94	42—44 "	3 —3½	Beardless.	22	40	61	"
46	Prospect	Aug.	6	99	46—48 "	3 —3½	"	22	30	57	"
47	Dayton	"	5	98	45—47 "	3¼—4	Bearded.	22	30	58	"
48	Red Fern	"	2	106	46—48 "	4½—5	"	22	30	62½	No rust.
49	Colorado	"	1	105	46—48 Medium.	3½—4	"	22	..	62	"
50	Dawn	July	31	104	40—42 Stiff.	4 —4½	Beardless.	22	..	59	"
51	Captor	Aug.	1	105	43—45 "	3½—4	"	22	..	60½	Slightly.
52	Rideau	"	1	105	43—45 "	3½—4	"	22	..	58¾	No rust.
53	No. 5645, Washington	"	9	105	45—47 "	2¼—2¾	Bearded.	21	50	62½	Badly.
54	No. 12, Australian	"	5	98	39—41 "	3¼—4	Beardless.	21	50	58	Slightly.
55	No. 23, Australian	"	7	111	47—49 "	4 —4¾	"	21	50	58	"
56	Speltz	"	7	111	36—38 Medium.	2 —2¼	Bearded.	21	50	40	"
57	Lakefield	"	6	99	46—48 "	3½—4	Beardless.	21	10	57	Badly.
58	Laurel	"	8	112	48—50 Stiff.	3¾—4¼	"	21	10	59	Considerably.
59	Morley	"	8	101	42—44 "	4 —4½	"	21	10	58	Slightly.
60	White Connell	"	8	112	42—44 "	3½—4¼	"	21	10	59½	"
61	White Russian	"	7	111	47½—48½ "	4¼—5	"	21	10	59	"
62	Admiral	"	8	112	44—46 "	3¼—4	"	21	10	58	Considerably.
63	No. 5646, Washington	"	7	103	38—40 "	2 —2¼	Bearded.	21	10	62½	"
64	No. 2, Australian	"	12	105	46—48 "	3¾—4¼	Beardless.	20	50	60	"

SPRING WHEAT—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
65	Alpha	Aug. 1	105	42—44	Stiff	4 —4½	Beardless.	20	40	61	No rust.
66	Robin's Rust Proof	" 8	112	49—51	"	3¼—4	"	20	40	58½	Considerably.
67	Benton	" 1	105	41—43	"	3½—4	"	20	40	62	Slightly.
68	Advance	July 31	104	41—43	"	3 —3½	Bearded.	20	40	61¼	No rust.
69	Monarch	Aug. 6	110	46—48	"	4¼—4⅝	Beardless.	20	30	59	Slightly.
70	No. 11, Australian	" 11	104	45—47	"	3¾—4¼	"	20	30	57½	Considerably.
71	Orleans	" 8	101	48—50	"	3½—4	"	20	30	59	Slightly.
72	Blair	" 1	105	40—42	"	3 —3½	"	20	—	63½	"
73	Countess	" 2	106	46—48	"	3 —3½	"	20	—	60½	No rust.
74	Red Swedish	" 7	111	48—50	"	4 —4¾	Bearded.	19	50	58	Slightly.
75	From Kerr Gifford, Portland, O.	" 7	103	36—38	"	1½—1¾	Beardless.	19	50	56	Badly.
76	Newdale	" 5	98	39—41	"	3 —3½	"	19	50	59	Slightly.
77	Robson	" 6	99	49—51	"	4 —4½	"	19	50	56	Considerably.
78	Redpath	" 8	101	48—50	"	4 —4½	"	19	50	...	Slightly.
79	Spence	" 5	98	45—47	"	3 —3½	Bearded.	19	50	57	"
80	Progress	July 28	101	44—46	"	4 —4½	Beardless.	19	50	58	No rust.
81	No. 25, Australian	Aug. 7	111	48—50	"	4½—5	"	19	50	56	Considerably.
82	Dawson	" 12	105	48—50	Medium	3¾—4¼	"	19	50	59½	"
83	No. 149, Minnesota	" 2	106	43—45	Stiff	3 —3½	"	19	40	62	Slightly.
84	Harold	July 21	94	42—44	"	2½—3	Bearded.	19	40	61½	"
85	No. 9, Australian	Aug. 2	106	42—44	"	3½—4	"	19	30	58	Considerably.
86	Stanley	July 31	104	39—41	"	3½—4	Beardless.	19	20	60	No rust.
87	Norval	" 28	101	42—44	"	3 —3½	Bearded.	19	20	61½	"
88	No. 28, Australian	Aug. 6	99	42—44	"	3½—4	Beardless.	19	10	58	Slightly.
89	Dufferin	" 1	105	41—43	"	3 —3½	Bearded.	19	10	60	No rust.
90	Florence	" 6	99	47—49	"	3½—4	Beardless.	19	10	61	Slightly.
91	Essex	" 8	112	45—47	"	3¾—4¼	"	19	10	58	"
92	Crawford	July 28	101	42—44	"	3½—4	"	19	—	61	No rust.
93	Fraser	" 22	95	39—41	"	3 —3½	Bearded.	18	40	62½	"
94	Angus	Aug. 1	105	45—47	"	3 —3½	Beardless.	18	40	60	Slightly.
95	Weldon	" 1	105	42—44	"	3½—4	"	18	40	61	No rust.
96	Polonian	" 9	102	41—43	Medium	5½—6	Bearded.	18	30	56	Considerably.
97	No. 5643, Washington	" 7	105	37—39	"	2¾—3¼	"	17	50	61	Slightly.
98	Byron	July 31	104	39—41	Stiff	3 —3½	"	17	50	59¼	No rust.
99	Japanese	" 24	97	36—38	"	3 —3½	"	17	20	61	Slightly.
100	Cassel	Aug. 8	112	43—45	"	3¾—4¼	Beardless.	17	10	58	"
101	Vernon	" 1	105	39—41	"	3½—4	Bearded.	17	10	59	No rust.
102	No. 21, Australian	" 6	99	40—42	"	3½—4	Beardless.	17	10	59	Considerably.
103	Summer No. 9, Norway	July 28	93	36—38	"	3 —3½	"	17	10	52	Slightly.
104	Mason	Aug. 1	105	39—41	Medium	3 —3⅝	"	16	40	62	"
105	No. 18, Australian	" 11	104	39—41	Stiff	2¾—3¼	"	16	30	60½	Considerably.
106	Strubes	" 7	100	42—44	"	3½—4½	Bearded.	16	30	60¼	Slightly.
107	Gehun	" 2	93	42—44	"	2½—3	"	16	30	59½	"
108	Ebert	July 22	95	38—40	Medium	2½—3	Beardless.	15	20	63	"
109	No. 5799, Washington	Aug. 9	105	41—43	"	5½—6	Bearded.	15	10	56	Considerably.
110	No. 7, Felbig Australian	" 8	101	45—47	Stiff	3¾—4½	Beardless.	15	10	58	"
111	Ladoga	July 27	100	35—37	"	3 —3½	Bearded.	14	40	57	No rust.
112	Bishop	Aug. 1	105	39—41	"	3½—4	Beardless.	13	50	60	"
113	Powell	" 8	96	41—43	"	3 —3½	"	13	10	57	Slightly.
114	No. 14, Australian	" 8	101	39—41	"	3¼—4	"	13	10	59	"
115	Leutewitzer Sand	" 5	98	37—39	"	3½—4	Bearded.	13	10	58½	"
116	Black Sea	" 2	95	38—40	"	3 —3½	"	13	10	55¼	"
117	No. 2959, Washington	" 7	103	39—41	"	2½—3	"	13	10	61½	"

In the foregoing list there are a number of new varieties including four new sorts from Prof. W. U. Hays, Agriculturist of the Minnesota Experiment Station. These have been sent out under numbers. There are also some additional varieties from Australia under numbers. From the United States Department of Agriculture the following have been received:—Nos. 5642, 5644, 5639, 5645, 5646, 5643, 5799 and 2599.

There are also included in this list fifty-four cross-bred sorts which have been originated at the experimental farms. The names of these are Admiral, Advance, Alpha, Angus, Beauty, Benton, Bishop, Blair, Blenheim, Boyle, Byron, Captor, Cartier, Cassel, Chester, Clyde, Countess, Crawford, Crown, Dawn, Dawson, Dayton, Dufferin, Early Riga, Ebert, Essex, Florence, Fraser, Grant, Harold, Hastings, Huron, Kingsford, Lakefield, Laurel, Mason, Morley, Newdale, Nixon, Norval, Orleans, Percy, Plumper, Powell, Preston, Progress, Prospect, Redpath, Robson, Spence, Stanley, Tracey, Weldon and Vernon.

The origin and parentage of all these, excepting thirteen, will be found in the annual reports for 1896-7-8 and 1900.

The thirteen now added are the following:—

No. 46. Dayton, bearded. Prince, female; Hard Red Calcutta, male.

No. 47. Grant, beardless. Alpha, female; Gehun, male.

No. 48. Kingsford, beardless. Red Fife, female ; Gehun, male.

No. 49. Lakefield, beardless. Campbell's White Chaff, female; Ladoga, male.

No. 50. Morley, beardless. Red Fife, female; No. 1 Club Bombay, male.

No. 51. Newdale, beardless. Gehun, female; Campbell's White Chaff, male.

No. 52. Nixon, beardless. Onega, female; Red Fife, male.

No. 53. Orleans, beardless. Red Fife, female; Campbell's White Chaff, male.

No. 54. Prospect, beardless. Rideau, female; Red Fife, male.

No. 55. Robson, beardless. White Fife, female; Hard Red Calcutta, male.

No. 56. Redpath, beardless. Red Fife, female; Campbell's White Chaff, male.

No. 57. Spence, bearded. Alpha, female; Hard Red Calcutta, male.

No. 58. Tracey, beardless. Silver Chaff, female; Anglo-Canadian, male.

Of these results in cross-fertilizing two are bearded varieties and eleven are beardless. Four of these were originated at the Central Experimental Farm by the Director, Nos. 49 and 58 in 1890, and Nos. 48 and 51 in 1892. One by Dr. C. E. Saunders in 1896, No. 54; three by Mr. W. T. Macoun in 1892, Nos. 46, 52 and 57, and one by Mr. J. L. McMurray, in 1890, No. 50. Four were originated by Dr. A. P. Saunders in 1892, two of them, Nos. 53 and 55 at the Experimental Farm at Brandon, Manitoba; one, No. 56, at the farm at Indian Head, N.W.T., and one, No. 47, at the farm at Agassiz, British Columbia.

SELECT LIST OF VARIETIES OF SPRING WHEAT.

In this list is given the average yield per acre obtained during the past three to seven years from the most productive varieties of spring wheat grown at all the experimental farms, with the length of time they have been under test. Only those are included which have been three years or longer under trial. The bearded and beardless sorts are also marked. Further particulars regarding these select lists will be found under ' Select list of oats.'

Number.	Names of varieties.	Head Bearded or Beardless.	Number of Years under trial.	Average Yield per acre at all the Experimental Farms.	
				Bush.	Lbs.
1	Roumanian	Bearded	3	39	44
2	Laurel	Beardless	3	35	38
3	Preston	Bearded	7	33	58
4	Wellman's Fife	Beardless	7	33	8
5	Monarch	"	7	33	8
6	Goose	Bearded	7	32	50
7	Huron	"	7	32	45
8	Red Fife	Beardless	7	32	30
9	White Fife	"	7	32	29
10	Hungarian	Bearded	6	32	10
11	White Connell	Beardless	7	32	6
12	White Russian	"	7	32	6
13	Rio Grande	Bearded	7	32	6
14	Clyde	Beardless	3	32	6
15	Crawford	"	3	32	3
16	Pringle's Champlain	Bearded	7	31	56
17	Red Fern	"	7	31	31
18	Crown	"	7	31	21
19	Stanley	Beardless	7	31	19
20	Blair	Bearded	4	31	7
21	Advance	"	7	30	58
22	Alpha	Beardless	7	30	53
23	Percy	"	7	30	24
24	Admiral	"	7	30	23
25	Fraser	Bearded	3	30	16
26	Blenheim	"	7	30	12
27	Weldon	Beardless	3	30	12
28	Red Swedish	Bearded	3	30	12
29	Progress	Beardless	6	30	5
30	Ebert	"	3	30	5
31	Vernon	Bearded	6	29	59
32	Dion's	"	7	29	53
33	Colorado	"	7	29	50
34	Countess	Beardless	6	29	48
35	Plumper	Bearded	4	29	40
36	Herisson Bearded	"	7	29	40
37	Mason	Beardless	4	29	38
38	Early Riga	"	3	29	36
39	Beauty	"	6	29	35
40	Dawn	"	6	29	30
41	Rideau	"	7	29	22
42	Campbell's White Chaff	"	7	29	16
43	Beaudry	Bearded	7	29	3
44	Byron	"	3	28	56
45	Dufferin	"	6	28	39
46	Captor	Beardless	7	28	7
47	Norval	Bearded	3	27	24
48	Ladoga	"	7	27	11
49	Harold	"	4	26	39

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY AND CLAY LOAM.

These experiments were all conducted on plots of one-fortieth acre each on both sandy loam and clay loam. It will be noticed that the crops are heaviest on the clay loam in every instance.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Rusted.
				Inches.		Inches.		Bus. Lbs	
WHEAT SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM SOIL.									
Preston 1 bush per acre	April 29	Aug. 7	100	45—47	Stiff	3½—4	Bearded	10 20	Slightly.
Preston 1¼ bush. per acre	" 29	" 7	100	45—47	"	3½—4	"	15 —	"
Preston 1½ bush. per acre	" 29	" 7	100	45—47	"	3½—4	"	19 40	"
Preston 2 bush. per acre	" 29	" 7	100	45—47	"	3½—4	"	20 20	"
Preston 2½ bush. per acre	" 29	" 7	100	42—44	Medium	3 —3½	"	21 —	"
Preston 3 bush. per acre	" 29	" 7	100	42—44	"	3 —3½	"	19 40	"
WHEAT SOWN IN DIFFERENT QUANTITIES PER ACRE ON CLAY LOAM SOIL.									
Preston 1 bush. per acre	" 27	" 2	97	48—50	Stiff	3½—4	"	28 20	"
Preston 1¼ bush. per acre	" 27	" 2	97	48—50	"	3½—4	"	28 20	"
Preston 1½ bush. per acre	" 27	" 2	97	48—50	"	3½—4	"	29 —	"
Preston 2 bush. per acre	" 27	" 2	97	48—50	Medium	3½—4	"	26 20	Considerably.
Preston 2½ bush. per acre	" 27	" 2	97	48—50	"	3½—4	"	26 20	"
Preston 3 bush. per acre	" 27	" 2	97	48—50	Weak	3 —3½	"	25 —	"
OATS SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM SOIL.									
Banner 1½ bush. per acre	" 29	" 3	96	42—44	Stiff	8 —9	Branching.	41 6	Slightly.
Banner 2 bush. per acre	" 29	" 3	96	42—44	"	8 —9	"	59 14	"
Banner 2½ bush. per acre	" 29	" 3	96	40—42	Medium	8 —9	"	57 2	"
Banner 3 bush. per acre	" 29	" 3	96	40—42	"	8 —9	"	43 18	"
Banner 3½ bush. per acre	" 29	" 3	96	30—32	Weak	7 —8	"	31 26	"
Banner 4 bush. per acre	" 29	" 3	96	30—32	"	7 —8	"	35 10	"
OATS SOWN IN DIFFERENT QUANTITIES PER ACRE ON CLAY LOAM SOIL.									
Banner 1½ bush. per acre	" 27	July 28	92	46—48	Stiff	9—10	"	58 28	"
Banner 2 bush. per acre	" 27	" 28	92	46—48	"	9—10	"	65 30	"
Banner 2½ bush. per acre	" 27	" 28	92	49—51	"	9—10	"	67 2	"
Banner 3 bush. per acre	" 27	" 28	92	49—51	Medium	9—10	"	64 24	"
Banner 3½ bush. per acre	" 27	" 28	92	40—42	"	9—10	"	61 6	"
Banner 4 bush. per acre	" 27	" 28	92	34—36	Weak	9—10	"	57 22	"

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Rusted.
				Inches.		Inches.		Bus. Lbs	
BARLEY SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM SOIL.									
Mensury 1½ bush. per acre	" 29	" 22	84	39—41	Stiff	3 —3½		35 35	None.
Mensury 2 bush. per acre	" 29	" 22	84	39—41	"	3 —3½		37 19	"
Mensury 2½ bush. per acre	" 29	" 22	84	39—41	Medium	3 —3½		43 11	"
Mensury 3 bush. per acre	" 29	" 22	84	39—41	"	3 —3½		42 19	"
Mensury 3½ bush. per acre	" 29	" 22	84	39—41	"	3 —3½		39 23	"
Mensury 4 bush. per acre	" 29	" 22	84	36—38	"	3 —3½		43 11	"
BARLEY SOWN IN DIFFERENT QUANTITIES PER ACRE ON CLAY LOAM SOIL.									
Mensury 1½ bush. per acre	" 27	" 19	83	39—41	Stiff	3 —3½		37 —	"
Mensury 2 bush. per acre	" 27	" 19	83	39—41	"	3 —3½		40 35	"
Mensury 2½ bush. per acre	" 27	" 19	83	43—45	"	3 —3½		44 3	"
Mensury 3 bush. per acre	" 27	" 19	83	41—43	Medium	3 —3½		45 35	"
Mensury 3½ bush. per acre	" 27	" 19	83	40—42	Weak	3 —3½		45 35	"
Mensury 4 bush. per acre	" 27	" 19	83	40—42	"	3 —3½		44 3	"

EXPERIMENTS WITH PEASE.

Sixty-one varieties of pease have been under trial in the uniform test plots during the past season. The soil on which these pease were sown was a sandy loam, which received a dressing of barn-yard manure during the winter of 1898-9 of about 12 tons per acre. The previous crop was oats. After the oats were taken off the land was cultivated shallow shortly after harvest to start shed grain and weed seeds, and ploughed again later in the autumn about 8 inches deep, and left in this condition until the following spring, when it was cultivated twice with a two-horse cultivator and twice with a smoothing harrow. The seed of all the varieties was sown on April 29 on plots of one-fortieth of an acre each, at the rate of two to three bushels per acre according to the size of the pea.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per Bushel.
					Inches.	Inches.	Bush.	Lbs.	Lbs.
1	Cooper	Aug. 15..	108	Strong.	74—80	2¼—2½	33	20	61½
2	English Gray	" 15..	108	"	75—80	2¼—2¾	32	..	59
3	Paragon	" 2..	95	"	35—40	1⅜—2¼	32	..	61
4	Nelson	" 6..	99	"	50—55	2¼—2¾	32	..	61½
5	French Canner	" 12..	105	Medium..	90—96	2¼—3	31	40	61
6	Bruce	" 18..	111	Very strong.	70 75	2½—2¾	31	40	61½
7	Centennial	" 20..	113	Medium.	65—70	2¼—2¾	31	20	61
8	Vincent	" 20..	113	Strong.	70—75	2½—2¾	30	40	61
9	Elder	" 14..	107	"	75—80	2 —2¼	30	40	61½
10	Chancellor	" 3..	96	"	65—70	1½—2	30	40	62½
11	Kent	" 14..	107	Very strong.	65—70	2½—2¾	30	40	62
12	Victoria	" 21..	114	" ..	70—75	2¼—2¾	30	..	61½
13	Carleton	" 14..	107	" ..	80—85	2¼—2¾	30	..	62½
14	Alma	" 14..	107	Medium.	65—70	2¼—3	30	..	61
15	Arthur	" 15..	108	Very strong.	60—65	2¼—2¾	30	..	61
16	Elliot	" 13..	106	" ..	65—70	2¼—2¾	30	..	62
17	King	" 18..	111	Strong.	75—80	2¼—2¾	29	20	61
18	Canadian Beauty	" 13..	106	Very strong.	72—76	2½—3	29	20	60½
19	Picton	" 15..	108	" ..	72—78	2 —2¼	29	20	61½
20	Golden Vine	" 13..	106	Strong.	70—75	2 —2¼	29	..	62½
21	Lanark	" 12..	105	"	76—82	2½—2¾	29	..	60
22	Bright	" 16..	109	"	72—78	2½—2¾	28	..	61½
23	Bedford	" 15..	108	Very strong.	90—95	2¾—2¾	28	..	62
24	Large White Marrowfat	" 14..	107	" ..	72—78	2¾—3¼	28	..	61
25	Perth	" 14..	107	Strong.	68—72	2½—2¾	28	..	61
26	Prussian Blue	" 6..	99	"	68—75	2½—2¾	27	20	61½
27	Mackay	" 10..	103	Very strong.	68—72	1⅝—2¼	27	20	61½
28	Pride	" 12..	105	Strong.	65—70	2 —2¼	27	20	62½
29	Mummy	" 15..	108	"	70—75	2¼—2¾	27	20	61½
30	Pearl	" 21..	114	Medium.	60—65	2½—2¾	27	20	62
31	Field Gray	" 16..	109	"	65—70	2 —2¼	27	20	62
32	Prince	" 13..	106	Strong.	70—75	2⅛—3	26	40	62
33	Daniel O'Rourke	" 5..	98	"	55—60	1⅞—2¼	26	40	63
34	Creeper	" 12..	105	"	68—72	2 —2½	26	40	62½
35	New Potter	" 20..	113	Strong	72—78	2¼—2½	26	40	61
36	Wisconsin Blue	" 17..	110	"	62—68	2 —2¼	26	..	63
37	Duke	" 15..	108	"	57—61	2 —2½	26	..	61½
38	Oddfellow	" 15..	108	Very strong.	50—55	1¾—2¼	26	..	63
39	Agnes	" 14..	107	"	65—70	2½—3	26	..	62
40	Black Eyed Marrowfat	" 19..	112	Strong	70—75	2¼—2¾	25	40	60
41	White Wonder	" 7..	100	Medium.	34—38	2 —2½	25	20	62
42	Archer	" 18..	111	Strong	70—75	2¼—2¾	25	..	61½
43	Macoun	" 19..	112	"	55—60	2¼—2½	24	40	61½
44	Multiplier	" 19..	112	"	72—76	2¼—2½	24	40	61½
45	Gregory	" 11..	104	"	70—75	2 —2½	24	40	61
46	Early Britain	" 13..	106	"	50—55	2¼—2½	24	40	58½
47	Crown	" 13..	106	Medium.	70—75	2 —2¼	24	20	63
48	Harrison's Glory	" 11..	104	Strong	54—58	2¼—2½	24	..	61½
49	Elephant Blue	" 13..	106	Very strong.	70—75	2¼—3	24	..	60
50	Prince Albert	" 21..	114	Strong	70—75	2¼—2½	24	..	59½
51	Fergus	" 17..	110	"	70—75	2¼—2½	24	..	61
52	Chelsea	" 19..	112	"	70—75	2 —2¼	23	40	61½
53	Dover	" 15..	108	"	57—61	2 —2½	22	40	62
54	Herald	" 20..	113	"	65—70	2¼—2¾	21	20	61½
55	Fenton	" 10..	103	"	72—76	2¼—2¾	20	.	59
56	Trilby	" 12..	105	"	62—68	2¼—2¾	19	20	61½
57	Maple	" 21..	114	"	68—72	2¼—2½	18	40	58½
58	German White	" 7..	100	"	70—75	1¾—2¼	18	20	61
59	Grass Pea	" 21..	114	"	55—60	1 —1¼	16	40	63½
60	Grey (Pisum Arvense, No. 13 fr. Norway)	" 6..	99	Medium.	36—38	¾—1¼	12	..	61½
61	Marrowfat (fr. Norway)	" 5..	98	"	46—48	2 —2¼	8	..	58½

The foregoing list includes the following thirty cross-bred sorts, all of which have been originated at the experimental farms:—Agnes, Alma, Archer, Arthur, Bedford, Bright, Bruce, Carleton, Chelsea, Cooper, Dover, Duke, Elder, Elliot, Fenton, Fergus,

Gregory, Herald, Kent, King, Lanark, Mackay, Macoun, Nelson, Pearl, Perth, Picton, Prince, Trilby and Vincent.

SELECT LIST OF VARIETIES OF PEASE.

In this list is given the average yield per acre obtained during the past three to seven years from the most productive varieties of pease grown at all the experimental farms, with the length of time they have been under test. Only those are included which have been three years or longer under trial. Further particulars regarding these select lists will be found under 'Select list of oats.'

Number.	Names of Varieties.	Number of Years under trial.	Average Yield per acre at all the Experimental Farms.
1	Crown	7	36 40
2	German White	4	36 1
3	Pride	7	36
4	Carleton	6	35 36
5	Picton	4	35 31
6	Chelsea	3	35 15
7	Early Britain	5	34 53
8	King	5	34 36
9	New Potter	7	34 30
10	Paragon	6	34 26
11	Duke	6	34 23
12	English Gray	3	34 15
13	Lanark	4	34 12
14	Pearl	3	34 10
15	Wisconsin Blue	3	34 2
16	Perth	5	33 53
17	Agnes	6	33 52
18	Archer	5	33 50
19	Gregory	4	33 42
20	Elliot	3	33 42
21	Arthur	6	33 37
22	Mummy	7	33 36
23	Fergus	4	33 30
24	Trilby	6	33 27
25	Chancellor	5	33 25
26	White Wonder	5	33 25
27	Centennial	7	33 21
28	Nelson	5	33 19
29	Bruce	3	33 14
30	Kent	6	33 9
31	Prussian Blue	5	33 5
32	Victoria	5	33 3
33	Prince Albert	7	32 58
34	Golden vine	7	32 58
35	Mackay	6	32 41
36	Prince	6	32 40
37	Dover	3	32 39
38	Black Eyed Marrowfat	7	32 37
39	Macoun	6	32 36
40	Vincent	5	32 24
41	Creeper	6	32 23
42	Oddfellow	5	32 18
43	French Canner	4	32 15
44	Elder	3	32 10
45	Bright	5	31 59
46	Large White Marrowfat	6	31 45
47	Fenton	4	31 44
48	Canadian Beauty	7	31 41
49	Elephant Blue	5	31 38
50	Daniel O'Rourke	6	31 35
51	Cooper	4	31 30
52	Alma	5	31 29
53	Bedford	6	31 25
54	Herald	3	31 15
55	Multiplier	7	31 3
56	Harrison's Glory	5	30 57

EXPERIMENTS WITH INDIAN CORN.

Thirty-seven varieties of Indian corn were tested during the season of 1900, side by side, on fairly uniform land. The soil was a sandy loam of good quality, which received a dressing of barn-yard manure, about twelve tons to the acre, during the winter of 1900-1. This was placed on the frozen land fresh from the barn-yard, in small heaps of about one-third of a cart load each, and spread and ploughed under in the spring. The previous crop was wheat. The land was gang-ploughed shallow shortly after wheat harvest to start weed seeds and shed grain, and ploughed again in the autumn seven or eight inches deep. In the spring of 1901, after the manure was spread and ploughed under, it was harrowed twice with the smoothing harrow before sowing. The corn was sown with the seed drill, in rows three feet apart, also in hills three feet apart each way; when the plants were from five to seven inches high they were thinned so as to leave them from six to eight inches apart in the rows, and from four to five kernels were left in each hill. The varieties were all sown on May 28, and were cut for ensilage on September 18. The yield per acre has been calculated from the weight of the crop cut from two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in Rows.	Weight per Acre grown in Hills.
			Inches.			Tons. Lbs.	Tons. Lbs.
1	Superior Fodder	Strong	120—130	Leafy	Glazed	24 840	25 820
2	Early Mastodon	Very strong.	120—130	"	Doughy	24 400	24 840
3	Early Butler	"	110—120	Very leafy	Late milk.	23 1,300	19 940
4	Thoro'bred White Flint	"	115—120	"	"	23 200	23 640
5	Extra Early Huron	"	115—125	Leafy	"	22 1,760	25 1,480
6	Cloud's Early Yellow	"	120—125	"	"	22 1,540	20 40
7	Giant Prolific Ensilage	"	120—130	"	"	22 1,540	19 1,600
8	Selected Leaming	"	120—130	"	Glazed	22	23 860
9	Red Cob Ensilage	"	120—130	Very leafy	Late milk.	22	21 20
10	Evergreen Sugar	Strong	105—115	Leafy	Early milk	21 1,120	18 520
11	Champion White Pearl	Very strong.	110—120	"	Late milk.	21 460	15 1,020
12	Rennie's B. B	"	125—130	"	Early milk	21 460	19 940
13	Country Gentleman	Medium	94—110	"	"	20 1,360	16 120
14	Sanford	Strong	120—125		Late milk.	19 1,820	17 1,200
15	Salzer's All Gold	Very strong.	115—125	"	Early milk	19 1,380	22 440
16	Mammoth Cuban	"	125—135	Very leafy	"	19 940	26 140
17	Canada White Flint	Strong	90—120	Leafy	Late milk.	18 1,840	17 100
18	Rennie's Victoria Yellow	Very strong.	130—140	"	Glazed	18 1,840	17 100
19	Pride of the North	"	105—115	"	Late milk.	18 1,820	11 1,760
20	Compton's Early	Medium	95—105	Leafy	Glazed	18 1,620	14 1,480
21	White Cap Yellow Dent	Very strong.	120—130	Very leafy	Early milk	18 1,300	19 500
22	Rennie's Earliest Ontario	Strong	105—115	Medium	"	18 300	20 1,360
23	King of the Earliest	"	105—115	Leafy	Doughy	18 80	18 1,620
24	Mamm. Eight-rowed Flint	Medium	95—105	"	Glazed	17 1,420	22
25	Black Mexican	"	90—100	"	"	16 1,660	14 1,480
26	Early Yellow Long Eared	"	105—110	"	Ripe	16 1,220	15 1,900
27	Longfellow	Strong	95—105	"	Glazed	15 360	20 40
28	North Dakota White	Medium	90— 95	"	"	14 1,700	19 500
29	Angel of Midnight	Strong	90—102	Fairly leafy	"	14 1,480	15 1,460
30	Pearce's Prolific	"	85— 95	Medium	"	14 1,260	18 520
31	North Dakota Yellow	Medium	80— 90	Leafy	"	14 1,040	18 1,400
32	Kendall's Early Giant	Weak	65— 75	"	Doughy	13 1,280	16 560
33	Early August	"	80— 90	Medium	Ripe	10 240	8 1,160
34	Salzer's Earliest Ripe	"	65— 75	"	"	9 700	10 1,120
35	Extra Early Szekely	"	65— 75	Leafy	"	9 260	11 440
36	Yellow Six Weeks	"	65— 75	Medium	"	9 40	9 1,360
37	Mitchell's Extra Early	"	60— 65	"	"	8 1,600	11 1,100

INDIAN CORN PLANTED AT DIFFERENT DISTANCES.

Three varieties were chosen for this test, the Champion White Pearl, Selected Leaming and Longfellow. They were sown in rows at different distances apart. The

soil was the same as that used for the test of varieties, and its treatment and preparation were the same. The corn was sown with the seed drill on May 28, and was cut for ensilage September 18. Four rows were sown in each case, and the yield per acre has been calculated from the weight of crop obtained from the two inside rows, each 66 feet long.

Name of Variety.	Width of Row.	Character of Growth.	Height when Cut.	Condition when Cut.	Weight per Acre.	
	Inches.		Inches.		Tons.	Lbs.
Champion White Pearl	21	Strong	120–130	Late milk.	27	665
" "	28	"	120–130	"	26	72
" "	35	Very strong.	125–135	"	24	1,720
" "	42	"	125–135	"	24	1,444
Selected Leaming	21	Strong	115–125	Glazed	24	1,010
"	28	"	115–125	"	20	186
"	35	Very strong.	125–135	"	19	194
"	42	"	125–135	"	21	1,902
Longfellow	21	Strong	95–100	"	20	1,470
"	28	"	95–100	"	19	770
"	35	Very strong.	100–110	"	18	838
"	42	"	100–110	"	17	1,156

SELECT LIST OF VARIETIES OF INDIAN CORN.

In this list is given the average yield per acre obtained during the past three to seven years from the more productive varieties of Indian corn grown at all the experimental farms, with the length of time they have been under test. Only those are included which have been three years or longer under trial. Fuller particulars regarding these select lists will be found under 'Select list of oats.'

Number.	Names of Varieties.	Number of Years under Trial.	Average Yield per Acre at all the Experimental Farms.	
1	Early Mastodon	4	21	690
2	Cloud's Early Yellow	5	19	1,001
3	Red Cob Ensilage	7	19	651
4	Thoroughbred White Flint	7	19	134
5	Selected Leaming	6	18	1,210
6	Early Butler	5	18	958
7	Mammoth Cuban	4	18	626
8	Giant Prolific Ensilage	7	17	1,976
9	Pride of the North	6	17	1,141
10	Champion White Pearl	7	17	1,054
11	Angel of Midnight	7	17	257
12	Mammoth Eight-rowed Flint	7	16	1,536
13	King of the Earliest	6	16	910
14	Sanford	7	16	627
15	Compton's Early	7	16	545
16	White Cap Yellow Dent	7	16	380
17	Evergreen Sugar	4	16	79
18	Longfellow	7	15	1,921
19	Canada White Flint	7	15	1,762
20	Country Gentleman	3	15	1,123
21	North Dakota White	7	15	983
22	Pearce's Prolific	7	15	505
23	Early Yellow Long Eared	3	14	1,837
24	Kendall's Early Giant	3	14	1,737
25	Black Mexican	3	14	1,127
26	Extra Early Huron Dent	7	14	1,004
27	Extra Early Szekely	3	12	789
28	Mitchell's Extra Early	7	11	1,042
29	Yellow Six Weeks	3	10	1,574

EXPERIMENTS WITH TURNIPS.

Twenty-nine varieties of turnips were on trial during the past season, all sown side by side on similar land. The soil was a clay loam of good quality, more or less mixed with sandy loam. The previous crop was experimental plots of wheat and barley. The land was ploughed early in the autumn of 1900 about eight inches deep. During the winter of 1900-1 this land received a dressing of about 12 tons of fresh barn-yard manure per acre, which was placed on the frozen ground in small piles of about a third of a cart-load each to prevent fermentation. This was spread in the spring, ploughed under about six inches deep, and harrowed with the smoothing harrow. The land was then made up in drills two feet apart, and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. The seed was sown at the rate of three pounds per acre. Two sowings were made of each sort, the first on May 8, the second on May 22. They were also pulled on two different dates. The first pulling was on October 14, and the second on October 28. The yield per acre has been calculated in each case from the weight of roots gathered from one row 66 feet in length.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing 1st Pulling October 14.		Yield per acre from 2nd Sowing 1st Pulling October 14.		Yield per acre from 1st Sowing 2nd Pulling October 28.		Yield per acre from 2nd Sowing 2nd Pulling October 28.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Carter's Elephant	41	1,820	29	80	43	790	37	910
2	Hartley's Bronze	41	1,490	29	80	42	480	30	1,380
3	Drummond Purple Top	40	520	28	760	40	520	32	680
4	Halewood's Bronze Top	39	1,530	28	430	39	1,200	29	1,730
5	Hall's Westbury	37	1,240	27	1,110	39	1,530	32	1,670
6	Sutton's Champion	37	1,240	28	1,090	32	20	30	60
7	Bangholm Selected	36	1,590	25	1,480	39	210	27	450
8	Emperor Swede	36	270	32	1,670	33	660	24	840
9	Champion Purple Top	34	1,300	27	450	40	190	31	40
10	Prize Purple Top	34	310	23	1,520	31	370	25	490
11	Magnum Bonum	33	1,650	24	1,830	35	950	32	680
12	Marquis of Lorne	33	1,320	27	120	30	1,710	24	840
13	New Arctic	33	990	21	240	34	310	29	1,730
14	Selected Purple Top	33	330	28	1,750	29	80	23	530
15	Skirvings	32	1,340	27	1,110	27	780	21	900
16	West Norfolk Red Top	32	1,340	26	800	27	120	21	240
17	Imperial Swede	32	1,340	22	880	35	1,280	28	1,420
18	Selected Champion	32	1,010	25	1,150	34	310	24	510
19	Shamrock Purple Top	32	20	26	1,790	31	700	24	1,830
20	Elephant's Master	31	1,690	20	1,580	37	580	28	1,750
21	Giant King	31	1,360	26	1,460	41	170	30	720
22	Prize Winner	30	1,380	26	140	29	1,730	24	180
23	East Lothian	30	720	27	1,440	36	270	30	1,050
24	Perfection Swede	30	60	29	1,070	31	1,360	26	1,130
25	Kangaroo	27	120	22	1,870	33	660	26	800
26	Monarch	25	490	22	880	18	1,620	21	900
27	Mammoth Clyde	24	180	22	550	33	990	30	720
28	Jumbo	23	1,850	20	590	33	1,320	25	490
29	Webb's New Renown	16	670	17	1,970	23	200	All rotten.	

	Tons.	Lbs.
The average from the 1st sowing, 1st pulling was	32	1,420
The average from the 2nd sowing, 1st pulling was	25	1,582
The average from the 1st sowing, 2nd pulling was	33	1,896
The average from the 2nd sowing, 2nd pulling was	27	1,381

Increase in Crop of Turnips from early Sowing, also from Late Pulling.

The results given point to the advantage of early sowing. The average yield of turnips from all the varieties from the first sowing and first pulling has exceeded that from the second sowing by 6 tons, 1,838 pounds per acre, and in the case of the second pulling made fourteen days later, the larger weight from the earlier sowing is well maintained, the difference being 6 tons, 515 pounds per acre in favour of early sowing.

The figures given also show that the fourteen days of additional time given to the roots to grow between October 14 and 28, resulted in an average increase in weight in the early sown plots of 1 ton 492 pounds per acre, while those later sown increased in weight during the same period 1 ton 1,799 pounds per acre.

SELECT LIST OF VARIETIES OF TURNIPS.

In this list is given the average yield per acre obtained during the past three to seven years from the more productive varieties of turnips grown at all the experimental farms, with the length of time they have been under test. Only those sorts are included which have been three years or longer under trial.

Number.	Names of Varieties.	Number of Years under trial.	Average Yield per acre at all the Experimental Farms.	
1	Selected Purple Top	7	31	266
2	Perfection Swede	6	31	202
3	Imperial Swede	3	30	1,948
4	Halewood's Bronze Top	5	30	783
5	Hall's Westbury	5	30	579
6	Hartley's Bronze	7	29	1,700
7	Bangholm Selected	5	29	1,648
8	Webb's Renown	3	29	296
9	East Lothian	7	29	174
10	Shamrock Purple Top	5	28	1,698
11	Carter's Elephant	7	28	1,206
12	Prize Winner	6	28	1,119
13	Skirvings	7	28	1,096
14	Drummond Purple Top	4	28	904
15	Jumbo	7	28	704
16	Prize Purple Top	7	28	610
17	Mammoth Clyde	6	28	549
18	Monarch	3	27	1,608
19	New Arctic	3	27	1,434
20	Sutton's Champion	6	27	1,280
21	Giant King	7	27	820
22	West Norfolk Red Top	3	27	502
23	Champion Purple Top	7	27	130
24	Marquis of Lorne	6	26	1,337

EXPERIMENTS WITH MANGELS.

Twenty-five varieties of mangels were under trial in 1901. These were all sown, side by side, adjoining the turnips; the land was similar in character and its treatment and preparation was the same. The drills were made up two feet apart and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made of each sort, the first on May 8, the second on May 22. They were also pulled on two different dates, the first pulling was on October 14, and the second on October 28. The yield per acre has been calculated in each case from the weight of roots gathered from one row 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing 1st Pulling October 14.		Yield per acre from 2nd Sowing 1st Pulling October 14.		Yield per acre from 1st Sowing 2nd Pulling October 28.		Yield per acre from 2nd Sowing 2nd Pulling October 28.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Champion Yellow Globe	45	1,080	28	430	47	1,370	30	1,710
2	Mammoth Yellow Intermediate	44	1,100	28	1,750	47	380	31	370
3	Yellow Intermediate	44	110	32	350	51	1,620	40	1,510
4	Giant Yellow Intermediate	43	790	30	1,380	39	870	36	270
5	Prize Winner Yellow Globe	42	1,800	34	1,630	55	550	44	440
6	Nobiton Giant	42	1,470	27	450	34	1,300	28	100
7	Half Long Sugar Rosy	42	480	27	450	40	1,180	27	120
8	Giant Yellow Half Long	42	480	34	1,300	41	170	27	780
9	Gate Post	41	850	35	290	38	230	31	40
10	Giant Yellow Globe	41	335	31	370	36	1,260	28	100
11	Half Long Sugar White	39	1,695	30	1,380	48	30	36	930
12	Mammoth Long Red	37	1,570	27	780	41	1,490	28	1,420
13	Warden Orange Globe	37	910	28	760	43	460	32	1,340
14	Golden Fleshed Tankard	36	1,590	24	675	33	330	28	100
15	Leviathan Long Red	36	1,260	30	1,380	46	1,720	42	1,800
16	Prize Mammoth Long Red	36	270	32	20	39	210	31	1,690
17	Lion Yellow Intermediate	35	1,280	31	1,360	41	1,820	36	600
18	Gate Post Yellow	34	1,960	30	60	34	970	24	840
19	Mammoth Oval Shaped	34	640	26	1,460	44	110	29	1,400
20	Selected Mammoth Long Red	34	640	28	1,420	47	710	36	270
21	Ward's Large Oval Shaped	34	310	22	1,540	37	1,240	30	1,710
22	Red Fleshed Tankard	33	1,320	26	510	34	640	26	800
23	Triumph Yellow Globe	33	990	25	490	47	1,040	37	250
24	Canadian Giant	30	225	30	60	38	1,550	32	1,670
25	Yellow Fleshed Tankard	29	1,070	24	1,830	39	210	30	1,710

	Tons.	lbs.
The average from the 1st sowing, 1st pulling was	38	648
The average from the 2nd sowing, 1st pulling was	29	405
The average from the 1st sowing, 2nd pulling was	41	1,978
The average from the 2nd sowing, 2nd pulling was	32	799

Increase in Crop from Early Sowing and Late Pulling.

The results obtained point to the advantage of early sowing. The average yield of mangels from all the varieties from the first sowing and first pulling has exceeded that of the second sowing by 9 tons 243 pounds per acre, and in the case of the second pulling made fourteen days later, the larger weight from the earlier sowing is well maintained, the difference being 9 tons 1,179 pounds per acre in favour of early sowing.

The figures given also show that the fourteen days of additional time given to the roots to grow between October 14 and 28 resulted in an average increase in weight on the early sown plots of 3 tons 1,330 pounds per acre, while those later sown increased in weight during the same period 3 tons 394 pounds per acre.

In looking through the list of varieties tested it would appear that the different strains of the Yellow Intermediate mangel are the most productive in this part of Canada, and that the strains of the Mammoth Long Red follow these closely. The Globe mangels average next best, while most of the tankard sorts range towards the bottom of the list.

SELECT LIST OF VARIETIES OF MANGELS.

In this list is given the average yield per acre obtained during the past three to six years from the more productive varieties of mangels grown at all the experimental farms, with the length of time they have been under test. Only those sorts are included which have been three years or longer under trial.

Number	Names of Varieties.	Number of Years Under Trial.	Average Yield per acre at all the Expt. Farms.
1	Yellow Intermediate	6	32 696
2	Giant Yellow Intermediate	6	32 254
3	Gate Post	6	31 160
4	Selected Mammoth Long Red	5	30 575
5	Mammoth Yellow Intermediate	5	29 1,841
6	Lion Yellow Intermediate	3	29 1,123
7	Giant Yellow Half Long	5	29 1,190
8	Giant Yellow Globe	6	29 686
9	Mammoth Long Red	6	29 495
10	Prize Mammoth Long Red	6	28 1,136
11	Norbiton Giant	5	28 4
12	Canadian Giant	6	27 1,861
13	Ward's Large Oval Shaped	5	27 1,020
14	Champion Yellow Globe	6	26 1,349
15	Mammoth Oval Shaped	6	26 444
16	Gate Post Yellow	4	25 1,519
17	Yellow Fleshed Tankard	3	25 841
18	Golden Fleshed Tankard	6	25 540
19	Warden Orange Globe	6	25 459
20	Red Fleshed Tankard	6	24 755

EXPERIMENTS WITH CARROTS.

Twenty varieties of carrots were under trial in 1901. These were all sown side by side adjoining the turnips and mangels; the land was similar in character and its treatment and preparation was the same. The drills were made up two feet apart, and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made of each sort, the first on May 8, the second on May 22. They were also pulled on two different dates, the first pulling was on October 14, the second on October 28. The yield per acre has been calculated in each case from the weight of roots gathered from one row 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing 1st Pulling October 14.		Yield per acre from 2nd Sowing 1st Pulling October 14.		Yield per acre from 1st Sowing 2nd Pulling October 28.		Yield per acre from 2nd Sowing 2nd Pulling October 28.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Half Long White	43	790	27	1,440	42	1,140	30	390
2	New White Intermediate	42	1,140	31	1,030	38	560	32	1,670
3	Mammoth White Intermediate	40	1,510	36	1,260	44	1,760	32	1,670
4	Giant White Vosges	38	890	30	1,050	42	1,470	32	1,010
5	Iverson's Champion	37	580	29	1,400	35	1,610	39	210
6	Half Long Chantenay	37	250	23	1,190	24	1,500	28	100
7	Ontario Champion	34	1,300	34	310	32	1,010	34	1,630
8	Improved Short White	33	660	32	20	34	1,960	35	1,940
9	Green Top White Orthe	30	1,050	22	1,870	37	910	31	1,690
10	Long Yellow Stump Rooted	28	1,750	23	860	29	1,400	25	1,480
11	White Vosges Large Short	24	1,500	22	1,870	29	1,070	28	1,430
12	Yellow Intermediate	24	1,500	17	980	33	330	22	550
13	Carter's Orange Giant	24	840	21	240	31	370	28	100
14	Early Gem	23	530	21	240	27	780	23	860
15	Guerande or Ox-Heart	22	550	21	570	26	1,790	27	1,970
16	Scarlet Intermediate	21	1,560	20	590	25	820	26	140
17	White Belgian	19	610	23	530	34	1,960	28	1,420
18	Long Orange or Surrey	17	1,970	14	1,370	19	1,270	17	980
19	Long Scarlet Altringham	16	1,330	14	50	20	1,580	17	1,310
20	Scarlet Nantes	14	710	13	730	19	940	15	360

	Tons.	lbs.
The average from the 1st sowing, 1st pulling was.....	28	1,651
The average from the 2nd sowing, 1st pulling was.....	24	180
The average from the 1st sowing, 2nd pulling was.....	31	1,212
The average from the 2nd sowing, 2nd pulling was.....	27	1,946

Increase in Crop from Early Sowing and Late Pulling.

The results obtained point to the advantage of early sowing. The average yield of carrots from all the varieties from the first sowing and first pulling has exceeded that from the second sowing by 4 tons 1,471 pounds per acre, and in the case of the second pulling the larger weight from the earlier sown plots is well maintained, the difference being 3 tons 1,266 pounds per acre in favour of early sowing.

The figures given also show that the fourteen days of additional time given to the roots to grow between October 14 and 28 resulted in an average increase in weight of crop on the earlier sown plots of 2 tons 1,261 pounds per acre, while those later sown increased in weight during the same period 3 tons 1,766 pounds per acre.

In scanning the list of varieties and noting their relative position it is evident that the several strains of the White Intermediate Carrot are much the most profitable to grow here. The White Belgian has done fairly well, but it is a very difficult sort to harvest owing to its great length and cylindrical form. The short-rooted varieties of the Half Long Chantenay type have also done well.

SELECT LIST OF VARIETIES OF CARROTS.

In this list is given the average yield per acre obtained during the past three to six years from the more productive varieties of carrots, grown at all the experimental farms, with the length of time they have been under test. Only those sorts are included which have been three years or longer under trial.

Number.	Names of Varieties.	Number of Years under Trial.	Average Yield per Acre at all the Experimental Farms.	
1	New White Intermediate	3	23	1,913
2	Half Long White	6	21	1,250
3	Giant White Vosges	6	21	1,245
4	Improved Short White	6	21	637
5	Ontario Champion	4	21	450
6	Mammoth White Intermediate	6	20	1,705
7	Iverson's Champion	6	20	601
8	Green Top White Orthe	5	19	1,601
9	White Belgian	6	18	897
10	White Vosges Large Short	3	18	104
11	Yellow Intermediate	6	17	1,335
12	Early Gem	6	17	1,295
13	Half Long Chantenay	6	17	923
14	Guerande or Ox-Heart	6	17	523
15	Carter's Orange Giant	6	15	208
16	Long Orange or Surrey	6	13	1,703
17	Scarlet Intermediate	6	13	320
18	Long Scarlet Altringham	6	12	506
19	Scarlet Nantes	3	11	1,443

EXPERIMENTS WITH SUGAR BEETS.

Seven varieties of sugar beets were under trial in 1901. These were all sown side by side adjoining the carrots; the land was similar in character and its treatment and preparation was the same. The drills were made up two feet apart and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were

made of each sort, the first on May 8, the second on May 22. They were also pulled on two different dates. The first pulling was on October 14, the second on October 28. The yield per acre has been calculated in each case from the weight of roots gathered from one row 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety	Yield per Acre from 1st Sowing. — 1st Pulling Oct. 14.		Yield per Acre from 2nd Sowing. — 1st Pulling Oct. 14.		Yield per Acre from 1st Sowing. — 2nd Pulling Oct. 28.		Yield per Acre from 2nd Sowing. — 2nd Pulling Oct. 28.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Red Top Sugar	34	640	25	1,150	32	20	26	470
2	Royal Giant	33	660	29	1,070	33	330	26	140
3	Danish Improved	33	330	25	490	26	140	22	880
4	Danish Red Top	31	1,360	25	1,480	29	1,400	22	880
5	Improved Imperial	28	430	26	1,130	26	1,790	26	1,130
6	Wanzleben	25	160	21	1,890	25	490	18	1,950
7	Vilmorin's Improved	22	1,210	18	300	20	590	15	30

	Tons.	lbs.
The average crop from the 1st sowing, 1st pulling was..	29	1,541
The average crop from the 2nd sowing, 1st pulling was..	24	1,359
The average crop from the 1st sowing, 2nd pulling was..	27	1,251
The average crop from the 2nd sowing, 2nd pulling was..	22	1,069

Results of Early Sowing and Late Pulling.

The figures given above point to the advantage of early sowing. The average yield of sugar beets from all the varieties from the first sowing and first pulling has exceeded that from the second sowing by 5 tons 182 pounds per acre, and in the case of the second pulling made fourteen days later, precisely the same result is reached, the first sowing exceeding the second by 5 tons 182 pounds per acre.

In this case, however, the figures show no advantage from delay in pulling. On the contrary the yield from the second pulling, both sowings have given at the rate of 2 tons 290 pounds per acre less in each case than was had from the first pulling.

SELECT LIST OF VARIETIES OF SUGAR BEETS.

In this list is given the average yield per acre obtained during the past four and five years from the more productive varieties of sugar beets, grown at all the experimental farms, with the length of time they have been under test. Only those sorts are included which have been three years or longer under trial.

Names of Varieties.	Number of Years under Trial.	Average Yield per Acre at all the Experimental Farms.	
		Tons.	Lbs.
Danish Red Top	4	26	246
Red Top Sugar	5	23	172
Danish Improved	5	22	1,091
Improved Imperial	5	22	792
Wanzleben	5	21	553
Vilmorin's Improved	5	19	118

FIELD PLOTS OF POTATOES.

The following field plots of potatoes were included in the area devoted to experimental purposes. The land on which these potatoes were planted was similar throughout, and the preparation and treatment were the same for all. The soil was a sandy loam, more or less mixed with clay. The previous crop was experimental plots of wheat. After the wheat crop was cut the land was gang-ploughed shallow to start into growth any shed grain or weed seeds lying on the surface; later in the autumn it was again ploughed seven to eight inches deep. During the winter of 1900 and 1901 it received a dressing of about 12 tons of fresh barn-yard manure per acre, which was placed during the winter on the frozen ground in small piles of about a third of a cart-load each to prevent fermentation. This was spread in the spring, ploughed under about six inches deep, and harrowed with the smoothing harrow, then made into drills two and a half feet apart and six inches deep for planting. The sets were put from 12 to 15 inches apart. They were all planted May 18, and dug October 4.

FIELD PLOTS OF POTATOES, EACH ABOUT ¼ ACRE.

Number.	Name of Variety.	Yield per Acre.	
		Bush.	Lbs.
1	Early Harvest	313	30
2	Early Sunrise	303	45
3	Wonder of the World	289	8
4	Early Andes	280	48
5	Vigorosa	270	
6	Rochester Rose	262	30
7	Everett	261	
8	Carman No. 1	246	9
9	Bovee	228	36
10	Honeoye Rose	196	30

Plots 8, 9 and 10 were partly in low land, which accounts for the smaller yield.

The results of the tests of potatoes grown in experimental plots will be found in the report of the Horticulturist.

SELECT LIST OF VARIETIES OF POTATOES.

In this list is given the average yield per acre obtained during the past three to seven years from the most productive varieties grown at all the experimental farms, with the length of time they have been under test. Only those are included which have been three years or longer under trial. On this account many of the newest sorts do not appear in this list. During the past seven years a large number of varieties have been tested, and quite a number of different sorts have failed to reach that standard of productiveness required if their cultivation is to be continued. The standard for potatoes is fixed in the same way as that for oats. This will be found explained under 'Select list of oats.'

The following 29 varieties have thus been dropped from the list during the past two years. Algoma No. 1, Columbus, Crown Jewel, Charles Downing, Early Gem, Fillbasket, Freeman, Good News, Honeoye Rose, Hopeful, Harbinger, Ideal, Lightning Express, London, King of the Roses, McKenzie, Monroe County, Orphans, Pride of the Table, Peerless Junior, Queen of the Valley, Russell's Seedling, Record, Satisfaction, Seedling No. 214, Stourbridge Glory, Table King, Victor Rose, World's Fair.

Number.	Names of Varieties.	Number of Years under Trial.	Average Yield per Acre at all the Experimental Farms.	
			Bush.	Lbs.
1	Uncle Sam	4	403	35
2	Seedling No. 230	6	391	43
3	Everett	7	390	41
4	Country Gentleman	3	387	58
5	Seedling No. 7	5	386	26
6	Irish Daisy	7	384	56
7	Bovee	4	384	45
8	American Wonder	7	384	6
9	American Giant	7	383	17
10	Late Puritan	7	369	14
11	Carman No. 1	7	367	22
12	Carman No. 3	5	366	40
13	Rose No. 9	5	366	33
14	Seattle	6	364	43
15	Empire State	7	363	11
16	Burnaby Seedling	6	361	50
17	Quaker City	5	361	26
18	Penn. Manor	3	361	10
19	State of Maine	7	359	34
20	General Gordon	6	358	33
21	Holborn Abundance	7	358	28
22	Clay Rose	7	357	34
23	Northern Spy	7	356	54
24	Green Mountain	6	356	46
25	Vanier	7	355	1
26	New Variety No. 1	6	354	54
27	Cambridge Russet	4	354	5
28	Maule's Thoroughbred	4	351	3
29	Dreer's Standard	7	350	56
30	Dakota Red	7	349	14
31	Reeves' Rose	5	348	51
32	I. X. L.	7	345	40
33	Hale's Champion	6	344	36
34	Vick's Extra Early	6	344	25
35	Money Maker	7	344	12
36	Troy Seedling	7	343	38
37	Delaware	7	342	55
38	Lee's Favourite	6	342	47
39	Rochester Rose	7	341	30
40	Lizzie's Pride	7	340	56
41	Brown's Rot Proof	6	339	41
42	Polaris	7	336	..
43	Irish Cobbler	5	335	11
44	Sir Walter Raleigh	4	334	33
45	Bill Nye	5	333	49
46	Early Norther	7	332	42
47	Early Puritan	7	332	8
48	Great Divide	7	332	1
49	Early White Prize	7	330	24
50	Rural Blush	7	329	53
51	Reading Giant	6	327	52
52	Pride of the Market	7	326	17
53	Chicago Market	6	326	2
54	Pearce's Prize Winner	6	325	28
55	White Beauty	7	324	15
56	Brownell's Winner	7	323	25
57	New Queen	7	322	28
58	Early Harvest	7	319	2
59	Early Sunrise	7	317	30
60	Flemish Beauty	6	316	51
61	Maggie Murphy	7	316	1
62	Houlton Rose	5	315	28
63	Sharpe's Seedling	7	309	27
64	Earliest of All	7	307	39
65	Rural No. 2	6	306	33
66	Thorburn	7	305	7
67	Beauty of Hebron	7	304	36

Number.	Names of Varieties.	Number of Years under Trial.	Average Yield per Acre at all the Experimental Farms.	
			Bush.	Lbs.
68	Daisy	7	303	54
69	Early Rose	7	302	8
70	Prize Taker	7	299	41
71	Early Market	3	298	19
72	Early Six Weeks	7	294	15
73	Ohio Junior	5	287	45
74	Burpee's Extra Early	7	282	59
75	Pearce's Extra Early	7	282	1
76	Early Ohio	7	273	51

EXPERIMENTS WITH SOJA BEANS.

Three plots of one-fortieth acre each were sown in rows at different distances apart, viz.: 21, 28 and 35 inches to gain information as to the best distance for sowing to secure the heaviest crops. The soil was a light sandy loam which received a dressing of barn-yard manure during the winter of 1899 and 1900 of about 12 tons per acre. The previous crop was potatoes. After the potatoes were dug, the land was ploughed late in the autmn to the depth of about seven or eight inches, and left in that condition until the following spring, when it was cultivated once with a two-horse cultivator and twice with a smoothing harrow. The beans were sown with a seed drill on May 6, and cut on September 21.

Plot 1. Sown in rows 21 inches apart; growth strong and even, leafy; average height 40 to 45 inches. The pods were well formed, but the beans were soft when the crop was cut. Total yield of green crop 14 tons 800 pounds per acre. Yield of beans, 14 bushels 40 pounds per acre.

Plot 2. Sown in rows 28 inches apart; growth strong and even, very leafy; average height 40 to 45 inches. The pods were well formed, the beans were full grown, and beginning to harden at time of cutting. Total yield of green crop, 16 tons 400 pounds per acre. Yield of beans, 16 bushels per acre.

Plot 3. Sown in rows 35 inches apart; growth very strong and even, leafy; stems hard and woody; average height 44 to 48 inches. The plants were better podded than those in plots 1 or 2, and the beans were harder when cut, but the plant was less valuable for fodder. Total yield of green crop, 15 tons 720 pounds per acre. Yield of beans, 10 bushels per acre.

EXPERIMENTS WITH HORSE BEANS.

Three plots of one-fortieth acre each were sown in rows 21, 28 and 35 inches apart, to gain information as to the best distance for sowing to secure the heaviest crop. The land was adjoining that used for soja beans, was similar in quality and received the same treatment. The previous crop was potatoes. The beans were sown with the seed drill; all the plots were sown on May 6, and cut on September 21.

Plot 1. Sown in rows 21 inches apart; growth strong, moderately well podded; height 47 to 50 inches, plot all standing. The beans were nearly ripe when cut. Total yield, 8 tons 1,280 pounds per acre. Yield of beans, 22 bushels 40 pounds per acre.

Plot 2. Sown in rows 28 inches apart; growth strong and well podded; height 49 to 53 inches. Plot all standing, stalks considerably stiffer than in plot No. 1. The beans were nearly ripe when cut. Total yield, 9 tons 1,600 pounds per acre. Yield of beans, 26 bushels 40 pounds per acre.

Plot 3. Sown in rows 35 inches apart; growth strong, well podded; height 49 to 53 inches. Plot all standing, stalks stiff. The beans were nearly ripe when cut. Total yield, 8 tons 400 pounds per acre. Yield of beans, 20 bushels 6 pounds per acre.

EXPERIMENTS WITH MILLETS.

Nine varieties of millet were sown on plots of one-fortieth acre each in drills seven inches apart. The soil was a light sandy loam. The previous crop was potatoes. The land receiving a dressing of barn-yard manure during the winter of 1899 and 1900 of about 12 tons per acre. After the potatoes were dug the land was ploughed to the depth of seven or eight inches, and left in that condition till the following spring, when it was cultivated once with a two-horse cultivator and twice with a smoothing harrow before sowing. The seed was sown with a Planet Junior seed drill, and all the varieties were sown on May 6. These were all cut when the seed was in the doughy stage. The two varieties under numbers were received for trial from the United States Department of Agriculture, Washington.

MILLETS—TEST OF VARIETIES.

Number.	Name of Variety.	Date Cut.	Length of Straw.	Character of Growth.	Weight per Acre, Green.		Weight per Acre, Dry.	
			Inches.		Tons.	Lbs.	Tons.	Lbs.
1	Cat-tail	Sept. 23.	60—65	Strong.	17	1040	8	1280
2	Pearl	Aug. 27.	32—38	"	16	1920	8	1280
3	White Round Extra French	July 27.	63—65	"	11	1040	5	1520
4	Moha Hungarian	" 27.	48—50	"	10	1760	5	240
5	Japanese	Aug. 27.	53—55	"	9	560	4	640
6	German or Golden	" 27.	48—50	"	8	1920	4	1920
7	Italian or Indian	" 27.	43—46	Medium.	7	1680	3	1360
8	No. 5647 (Dept. Agr., Wash., U.S.A.)	" 12.	34—36	"	6	800	3	720
9	No. 5648 (" " ")	" 12.	34—36	"	6	480	3	400

EXPERIMENTS WITH MIXED ROOTS AND WITH MIXED ROOTS AND VEGETABLES.

Four plots were sown with mixtures of field roots, and one with carrots, cabbages and tomatoes to see how far a farmer could thus supply himself with such material for his own use at very little cost and labour.

Four rows were sown in each case about 100 feet long and two feet apart, the seed was sown about the usual thickness and the plants subsequently thinned. About equal parts by weight of seed was used in all the plots, excepting No. 5, where it was used in about equal proportions by measure. Any undue proportion of young plants of any sort can be regulated when the thinning is done. They were all sown May 8, and the roots were pulled October 30. The vegetables were gathered about the middle of September.

Mixed Roots and Roots and Vegetables.			Yield per Acre.	
			Tons.	Lbs.
Plot 1—Mangels, carrots and turnips			40	1,840
" 2—Mangels and turnips			39	1,200
" 3—Mangels and carrots			39	870
" 4—Carrots and turnips			38	230
Carrots, Cabbages and Tomatoes.	Tons.	Lbs.		
5 Yield per acre of Cabbage	18	960		
" " Carrots	7	520		
" " Tomatoes	8	1,820	34	1,300

Although sown out of doors and having no advantage in the way of hot-bed cultivation, the tomatoes grew well and ripened a large crop, the cabbage also which was an early variety formed fine heads. All cultivation was by horse cultivator until the plants got too large to admit of this. The expense, both for seed and labour was very trifling. The yield per acre has been calculated in each case from the weight of one row 66 feet long.

INFLUENCE OF PREVIOUS CROPS ON GROWING GRAIN.

In the annual report for 1900, some experiments were reported on in the growing of oats after other crops to gain information regarding the influence of previous crops on subsequent growth, and how long this influence is apparent. Six plots were then referred to where Sensation oats were grown after flax, grain, horse beans, soja beans, Indian corn and millet, and particulars regarding the oat crop given. This year the test has included four plots only, the Indian corn and millet plots having been omitted. Barley was sown instead of oats, the variety chosen being the Mensury, which was sown at the rate of $1\frac{3}{4}$ bushels per acre. The soil in this instance was a sandy loam which had received no manure since 1897, when an application was made of about 12 tons per acre. The land was ploughed late in the autumn of 1900 to a depth of 7 or 8 inches, and in the spring of 1901 it was cultivated twice with the two-horse cultivator, and well harrowed before sowing.

Sown in 1899.	In 1900.				In 1901.			
	Sensation oats Yield per Acre.		Length of Straw.	Length of Head.	Mensury barley Yield per Acre.		Length of Straw.	Length of Head.
	Bush.	Lbs.	Inches.	Inches.	Bush.	Lbs.	Inches.	Inches.
Plot 1—Flax	49	14	40—45	8 — $9\frac{1}{2}$	35	—	37—39	3—$3\frac{1}{2}$
" 2—Grain	58	28	43—48	$8\frac{1}{2}$— $9\frac{1}{2}$	39	8	36—38	3—$3\frac{1}{2}$
" 3—Horse beans	60	14	46—50	9 —10	40	—	38—40	3—4
" 4—Soja beans	49	14	40—45	$8\frac{1}{2}$— $9\frac{1}{2}$	31	32	33—35	3—$3\frac{1}{2}$

EFFECTS OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR OATS.

In the spring of 1900, six plots of one-eightieth of an acre each were sown with grain. Two of these plots were sown with Preston wheat, two with Mensury barley,

and two with Banner oats. One plot in each case had common red clover sown with the grain at the rate of 12 pounds per acre, the other had no clover. The soil was a light sandy loam of fairly good quality, which had received no manure or other fertilizer since 1897, when it had an application of about 12 tons per acre.

After the grain was harvested in 1900, the clover on the alternate plots made good growth, and when the time arrived for ploughing it under it had made a good mat of foliage. This was turned under about the middle of October, and in the spring of 1901 it was cultivated twice with the two-horse cultivator, and harrowed before sowing. The Banner oats were sown on May 4, and cut August 5.

Variety.	Length of Straw.	Length of Head.	Yield of Oats per acre.	Weight of Straw per acre.
Banner oats sown after,	Inches.	Inches.	Bus. Lbs	Lbs.
Wheat Preston, 1900, no clover	42—44	8—9	47 2	2,480
Wheat Preston, 1900, with clover	47—49	8—9½	49 14	3,440
Barley Mensury, 1900, no clover	40—42	8—9	37 22	1,920
Barley Mensury, 1900, with clover	47—49	8—9½	42 12	2,640
Oats Banner, 1900, no clover	37—39	8—9	35 10	2,240
Oats Banner, 1900, with clover	46—48	8—9½	40 --	3,040

The average gain in those plots where clover was grown was, in grain 3 bushels 31 pounds per acre, and in straw 827 pounds per acre, an increase of nearly 10 per cent in the grain, and over 35 per cent in the straw.

EFFECTS OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR INDIAN CORN.

In the spring of 1900, six plots of one-eightieth of an acre each were sown with grain. Two were sown with Preston wheat, two with Mensury barley, and two with Banner oats. One plot in each case had common red clover sown with the grain at the rate of 12 pounds per acre, the other had no clover. These plots were adjoining those of a similar test of oats, and the soil was of the same character and had received the same preparatory treatment. After the grain was harvested in 1900, the clover was allowed to grow until the following season, and was ploughed under about the middle of May, by which time it had made a very heavy growth. The variety of corn chosen for these tests was the Selected Leaming, which was sown on May 23, in rows 3 feet apart, and cut September 18. The results are given in the appended table.

Variety.	Height.	Leafiness.	Condition when cut.	Weight of green fodder per Acre.
Selected Leaming grown after,	Inches.			Tons. Lbs.
Wheat Preston, no clover	85— 90	Medium..	Late milk.	19 1,280
Wheat Preston, with clover	92—106	Very leafy	" .	27 1,760
Barley Mensury, no clover	85— 90	Medium..	" .	15 1,660
Barley Mensury, with clover	92—106	Very leafy	" .	27 880
Oats Banner, no clover	85— 90	Medium..	" .	20 160
Oats Banner, with clover	92—106	Very leafy	" .	25 1,660

The average gain in green fodder on the plots where clover was grown, was 8 tons 1,066 pounds per acre, an increase of over 40 per cent.

EFFECTS OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR POTATOES.

In the spring of 1900, six plots of one-eightieth of an acre each were sown with grain. Two were sown with Preston wheat, two with Mensury barley, and two with Banner oats. One plot in each case had common red clover sown with the grain at the rate of 12 pounds per acre, the other had no clover. These plots were adjoining those of a similar test with oats and Indian corn, and the soil was of the same character and had received the same preparation. After the grain was harvested in 1900, the clover was allowed to grow until the following season, and was ploughed under about the middle of May, by which time it had made a very heavy growth. The variety of potato chosen for this test was the Everett, which was planted on May 23, in rows 3 feet apart, and dug October 4. The results were as follows:—

Variety Everett.	Yield per acre.	
Everett potato planted after,	Bush.	Lbs.
Preston wheat, no clover	396	40
Preston wheat, with clover	440	
Mensury barley, no clover	396	
Mensury barley, with clover	420	
Banner oats, no clover	381	20
Banner oats, with clover	411	20

The average gain of potatoes on the plots where the clover was grown, was 32 bushels 27 pounds per acre, being an increase of over 8 per cent.

EFFECTS OF FERTILIZERS ON SPRING WHEAT, OATS, CLOVER AND BROME GRASS.

During the season of 1900, two series consisting in each case of sixteen one-eightieth acre plots were laid out, twelve of which in each set were treated with different fertilizers, and the remaining four left as check plots which received no fertilizers.

One set of these plots was sown with spring wheat of the variety known as Preston, another with a variety of oats known as Improved Ligowo. Two other series each consisting of nine plots were planned, one to be used for experiments with common red clover, and the other for the Awnless Brome grass *Bromus inermis.*

The object in view in these tests is to gain information as to the effects on crops sown on land in a fair average condition of fertility, of superphosphate of lime and Thomas' phosphate, both used singly, also of superphosphate of lime with kainit and with kainit and nitrate of soda, and of Thomas phosphate with kainit, and with kainit and nitrate of soda. In the series of plots planned for wheat and oats, provision was also made for testing the relative value of barn-yard manure fresh and rotted, fresh slaked lime and nitrate of soda alone in the proportions of 100 and 200 pounds per acre with a check plot between them. In 1900 all these were reported on, but this year through a misunderstanding the last five plots in each of these series were not sown, hence returns can only be given for nine plots in each case.

The land chosen for this test was in a fairly good condition of tilth. The soil was a sandy loam which has been under cultivation since 1887, and has been cropped each year since, with a suitable rotation of crops and has received a dressing of barn-yard manure about once in four years. The last application of manure was in 1897 when it received about 12 tons per acre. The land was cropped in 1899 with experimental grain in plots mostly barley.

It is proposed to grow the same crops on this land for a series of years, using the same fertilizer in the same quantities every second year. In this way it is hoped that some further information may be gained as to the effect of these different fertilizers when used singly and in combination on the important crops named. As this land was at the start in a fair average condition as to fertility, it may be regarded as representing in a general way average sandy loams on farms properly worked. The fertilizers were applied in the spring of 1900, but none were used in 1901. The spring wheat and oats were both sown on May 4, and both were ripe on August 5.

RESULTS OF THE APPLICATION OF FERTILIZERS TO SPRING WHEAT.

No. of Plot.	Name of Variety, Preston.	Season of 1900.	Season of 1901.		
		Yield of grain per acre.	Yield of grain per acre.		Weight of straw per acre.
	Fertilizers used.	Bush. Lbs.	Bush.	Lbs.	Lbs.
1	Superphosphate, 400 lbs. per acre	25 20	26	40	2,800
2	Thomas' phosphate, 400 lbs. per acre	25 20	30	40	2,240
3	Thomas' phosphate, 800 lbs. per acre	25 20	28	—	2,480
4	Check	26 40	26	40	2,400
5	Thomas' phosphate, 400 lbs., kainit, 200 lbs. per acre	26 40	24	—	2,000
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	24 40	24	—	2,000
7	Check	25 20	27	20	1,960
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	26 —	26	40	2,240
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	26 —	24	40	2,120

RESULTS OF THE APPLICATION OF FERTILIZERS TO OATS.

No. of Plot.	Name of Variety, Improved Ligowo.	Season of 1900.	Season of 1901		
		Yield of grain per acre.	Yield of grain per acre.		Weight of straw per acre.
	Fertilizers used.	Bush. Lbs.	Bush.	Lbs.	Lbs.
1	Superphosphate, 400 lbs. per acre	70 20	47	20	3000
2	Thomas' phosphate, 400 lbs. per acre	72 22	51	26	3280
3	Thomas' phosphate, 800 lbs. per acre	72 22	45	30	2920
4	Check	75 10	42	12	2400
5	Thomas's phosphate, 400 lbs. kainit, 200 lbs. per acre	70 20	40	—	2240
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	73 18	40	—	2560
7	Check	73 18	42	12	2800
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	70 20	49	14	3200
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	68 8	51	26	3680

In both these series of tests the two check plots to which no fertilizers have been applied have given crops of grain averaging as large as those on which fertilizers have been used. The crops of straw, however, average heavier on the plots which were fertilized. This would seem to indicate that the land still contains as much available plant food as the crops could utilize for grain production under the conditions prevailing during these two seasons. With the partial exhaustion which successive crops will produce, the relative usefulness of the several fertilizers will probably be more clearly shown.

On the plots used for the tests of common red clover the seed was sown in the spring of 1900, in the proportion of 12 pounds per acre, and on the plots for brome grass the seed was also sown in the spring of 1900, in the proportion of 20 pounds per acre. The growth, both of clover and brome grass, was strong on all these plots.

RESULTS OF THE APPLICATION OF FERTILIZERS TO CLOVER.

No. of plot	Fertilizers used.	Length of clover. 1st cutting	Length of clover. 2nd cutti'g	Yield per acre green 1st cutting.		Yield per acre cured 1st cutting.		Yield per acre green 2nd cutting.		Yield per acre cured 2nd cutting.	
		Inches.	Inches.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs	Tons.	Lbs
1	Superphosphate, 400 lbs. per acre	34—36	18—20	14		3	1,080	4	1,520	1	640
2	Thomas' phosphate, 400 lbs. per acre	32—34	17—19	14	1,440	3	1,920	7	400	1	1,480
3	Thomas' phosphate, 800 lbs. per acre	36—40	17—19	13	1,680	3	1,440	7		1	1,280
4	Check	32—34	19—21	13	720	3	960	6	240	1	1,200
5	Thomas' phosphate, 400 lbs. kainit, 200 lbs per acre	32—34	19—21	13	1,840	3	1,040	5	1,920	1	1,200
6	Superphosphate, 400 lbs. kainit, 200 lbs. per acre	36—38	19—21	13	1,280	3	1,040	3	1,040	1	240
7	Check	32—34	19—21	12	1,600	3	1,200	4	1,840	1	1,200
8	Thomas' phosphate, 400 lbs. kainit, 200 lbs. nitrate soda 100 lbs. per acre	38—40	16—18	13	160	3	1,120	2	1,440		1,600
9	Superphosphate, 400 lbs. kainit, 200 lbs. nitrate soda, 100 lbs. per acre	34—36	18—20	12	960	3	1,040	1	1,840		1,120

RESULTS OF THE APPLICATION OF FERTILIZERS TO AWNLESS BROME GRASS.

(*Bromus inermis.*)

No. of plot	Awnless Brome Grass (Bromus inermis).	Length of Brome Grass.	Yield per acre green.		Yield per acre cured.	
	Fertilizers used.	Inches.	Tons.	Lbs.	Tons.	Lbs.
1	Superphosphate, 400 lbs. per acre	48—52	7		4	640
2	Thomas' phosphate, 400 lbs. per acre	48—50	6	1,840	3	1,600
3	Thomas' phosphate, 800 lbs. per acre	46—48	5	480	2	1,600
4	Check	44—46	4	800	1	1,920
5	Thomas' phosphate, 400 lbs. kainit, 200 lbs. per acre	46—48	5	240	2	800
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	46—48	4	1,120	2	80
7	Check	47—50	4	1,920	2	320
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	47—50	7	560	3	800
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	42—44	5	1,440	2	520

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the annual report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combination of fertilizers on the more important farm crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn and five years' experience with

crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continued; and as explanatory regarding the preparations made and the general plan together with the way in which they have been carried on, the following paragraphs are quoted from the report of 1893:—

'A piece of sandy loam more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded 6 inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles, on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping.

'The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. It was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn, and in 1889 all the series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890.' In all cases the plots in each series have been sown on the same day.

'In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land, one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also the half of the barley plots cropped with sugar beets that year.' In 1894, 1895, 1896, 1897 and 1898 the one-half of the oat plots were sown again with carrots and the half of the plots devoted to wheat and barley were planted with potatoes.

TREATMENT OF SOIL.

'The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again later, about 7 inches deep. In spring the plots have been gang-ploughed once before applying the fertilizers, which are then scattered over the surface and harrowed with the smoothing harrow before sowing. On those plots where barn-yard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and just before sowing. Wherever barn-yard manure is spoken of, it is understood to be a mixture of horse and cow manure in about equal proportions.'

A summary of these permanent fertilizer plots is given each year, taking the average yield of the whole previous period, adding the results of the current year, and then giving the average yield for the full time.

OBJECTS IN VIEW IN CONDUCTING THESE EXPERIMENTS.

It should be distinctly understood that in establishing and conducting this series of experiments, the object in view has been to gain as much information as possible as to the actual effects of certain fertilizers and combinations of fertilizers on particular crops. These experiments were never intended to serve as model test plots such

as farmers could copy to advantage in their general practice. On the contrary, to gain the information desired, it has been found necessary to use some fertilizers in extravagant quantities, and in other instances to more or less exhaust the soil by a succession of crops of the same sort, practices which in ordinary farming would be detrimental. Nevertheless, much useful information has been acquired, some of a positive and some of a negative character, by this long-conducted and extensive series of tests. The information now gained from year to year throws light in many ways on the action of fertilizers and is increasingly useful.

VALUABLE INFORMATION GAINED.

As results of these trials, it has been shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

At the time when these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

The use of sulphate of iron, which at the time these tests were begun, was highly recommended by an authority at that time eminent, as a reliable means of producing increased crops, has also been proven to be almost useless for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a most valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and in No. 8 also, in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate was used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened and the conditions, for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year ten pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The clover seed germinated well, and after the grain was cut the young clover plants made rapid growth, and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. The growing of carrots and potatoes on one half of the cereal plots has been discon-

tinued since 1898, and each plot of the wheat, barley and oats has occupied the full tenth of an acre.

In 1900 and 1901 clover was again sown on all the grain plots, which produced a good growth during the season and was ploughed under in October.

APPLICATION OF FERTILIZERS DISCONTINUED.

Another direction in which information was sought was in reference to the length of time which a liberal application of barn-yard manure would continue to affect subsequent crops, and in 1899 on plots 1, 2 and 6 the barn-yard manure, which had been used for ten or eleven years in succession, was discontinued. The phosphate fertilizer was also omitted on plot 6 in each series.

In 1900 all the fertilizers on all the plots were discontinued, and it is proposed to continue to grow the same crops on all these plots from year to year without fertilizers for some years, sowing clover with the grain each season. In this way it is expected that much information will be gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which have been used on these plots since the experiments were begun.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover to advantage on the Indian corn and root plots, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre, and no fertilizers were applied. The clover on these plots made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and add to the fertility of the soil, and was left over for further growth in the spring of 1901, and ploughed under for the roots about May 10, and for corn about the middle of that month. Then roots and Indian corn were again sown. This course will be continued for some years, growing Indian corn and roots every second year, and common red clover the alternate season. No fertilizers were applied in 1900 or 1901, and it is proposed to discontinue their use entirely for some years, so that the effect on these crops of the ploughing under of clover every second year may be carefully studied under the varying conditions presented by these more or less exhausted plots.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894; and the varieties used were as follows:— In 1888-89-90 and 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, the Rio Grande wheat was used, when, owing to lack of germinating power in the seed, a larger quantity was required. In 1895, 1896, 1897, 1898, 1899, 1900 and 1901 Red Fife wheat was used in the usual quantity of 1½ bushels per acre. In 1901, the Red Fife was sown April 30, came up May 8, and was ripe from August 10 to 12.

The season of 1901 has not been specially favourable for the growing of spring wheat at Ottawa, and the fact that all the plots have increased in yield notwithstanding that the fertilizers have been all discontinued for the past two years seems to show that the ploughing under of the green clover is having a beneficial effect. This influence is very evident on the check plots which have been unmanured from the beginning where the increase both in grain and straw is remarkable.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$TH ACRE EACH.

No. of Plot.	Fertilizers applied each Year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Thirteen Years.		14th Season, 1901, Variety Red Fife.		Average Yield for Fourteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then	21 $26\frac{7}{13}$	3,965	26 50	5,370	21 $49\frac{9}{14}$	4,065
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then	22 $4\frac{4}{13}$	4,007	28 45	5,295	22 $14\frac{3}{14}$	4,099
3	Unmanured from the beginning	10 $33\frac{1}{13}$	1,873	17 20	2,370	11 $2\frac{2}{14}$	1,908
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' Phosphate was used. No fertilizers have been applied since then	10 45	2,027	18 15	2,785	11 $17\frac{2}{14}$	2,081
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	12 $33\frac{11}{13}$	2,855	13 15	2,825	12 $36\frac{11}{14}$	2,853
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons' per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.	18 $46\frac{10}{13}$	3,300	23 20	4,575	19 $6\frac{4}{14}$	3,371
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	12 $46\frac{8}{13}$	2,510	16 50	3,885	13 4	2,608
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	10 $49\frac{6}{13}$	2,078	14 35	3,145	11 $5\frac{5}{14}$	2,154
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	11 $57\frac{12}{13}$	1,890	15 50	2,420	11 $55\frac{12}{14}$	1,928
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 $53\frac{6}{13}$	3,029	14 40	2,745	13 $1\frac{1}{14}$	3,009

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$TH ACRE EACH—*Continued.*

No. of Plot.	Fertilizers applied each Year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Thirteen Years.		14th Season, 1901. Variety, Red Fife.		Average Yield for Fourteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
11	Mineral superphosphate, No. 1. 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizers have been applied since then	14 16 $\frac{2}{13}$	2,821	16 5	3,750	14 23 $\frac{13}{14}$	2,887
12	Unmanured from the beginning	9 47 $\frac{4}{13}$	1,810	15 5	3,235	10 10	1,931
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 1 $\frac{5}{13}$	1,965	16 5	2,750	12 18 $\frac{11}{14}$	2,021
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	15 7 $\frac{9}{13}$	2,474	15 —	3,860	15 7 $\frac{2}{14}$	2,573
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13 33 $\frac{1}{13}$	2,360	17 10	2,850	13 48 $\frac{5}{14}$	2,395
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then.	15 21	2,134	17 30	2,870	15 30 $\frac{7}{14}$	2,187
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 24	2,343	15 50	2,720	12 38 $\frac{10}{14}$	2,379
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 27 $\frac{9}{13}$	1,874	14 20	2,690	12 35 $\frac{10}{14}$	1,932
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	13 25 $\frac{5}{13}$	1,523	16 —	2,035	13 36	1,560
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then	12 26 $\frac{7}{13}$	1,890	14 50	2,135	12 37	1,908
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been used since then	12 42 $\frac{2}{13}$	1,882	18 —	2,195	13 6	1,904

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, 1½ bushels in 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898, 1899, 1900 and 1901. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows: 1889, 1890 and 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894, 1895, 1896, 1897, 1898, 1899, 1900 and 1901, Cana-

dian Thorpe, a selected form of the Duck-bill. In 1901 the Canadian Thorpe was sown on April 29, came up May 8, and was harvested from July 25 to 30.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years.		13th Season, 1901. Variety, Canadian Thorpe.		Average Yield for Thirteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure has been applied since then	34 42 4/12	3,019	29 28	3,045	34 23 7/13	3,021
2	Barn-yard manure, fresh, 15 tons per acre, each year to 1898, inclusive. No manure has been applied since then	35 12 2/12	3,198	28 26	3,155	34 35 5/13	3,195
3	Unmanured from the beginning	13 5 1/12	1,512	10 15	1,120	12 42 11/13	1,482
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used, no fertilizers have been applied since then	14 7 5/12	1,430	14 13	1,635	14 7 11/13	1,446
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	20 13 1/12	2,235	21 12	1,850	20 16 9/13	2,205
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.	27 38 9/12	2,377	22 34	2,605	27 19 12/13	2,394
7	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	24 21 2/12	2,402	27 24	1,785	24 32 6/13	2,355
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	19 31 3/12	1,712	18 46	1,915	19 29 2/13	1,729
9	Mineral superphosphate, No. 1, 500 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	20 26 3/12	1,807	14 33	1,105	20 4 8/13	1,753
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	28 13 6/12	2,357	18 1	2,755	27 23 8/13	2,388

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years.		13th Season, 1901. Variety, Canadian Thorpe.		Average Yield for Thirteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	26 $10\frac{4}{12}$	2,506	19 8	2,220	25 $32\frac{4}{13}$	2,484
12	Unmanured from the beginning.....	12 $43\frac{7}{12}$	1,215	10 10	1,495	12 $33\frac{8}{13}$	1,237
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	13 $43\frac{1}{12}$	1,419	12 19	1,565	13 $37\frac{7}{13}$	1,430
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	22 $32\frac{4}{12}$	2,040	21 2	2,180	22 $26\frac{4}{13}$	2,051
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	21 $42\frac{5}{12}$	2,329	18 1	2,400	21 $28\frac{2}{13}$	2,334
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	22 $6\frac{1}{12}$	1,827	20 30	2,035	22 $\frac{7}{13}$	1,843
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	18 $31\frac{10}{12}$	1,933	16 7	2,135	18 $22\frac{7}{13}$	1,949
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	17 $44\frac{10}{12}$	1,692	13 46	1,540	17 $30\frac{2}{13}$	1,680
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then.....	27 $26\frac{11}{12}$	2,016	21 22	1,810	27 $4\frac{5}{13}$	1,846
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then.....	19 $28\frac{10}{12}$	1,605	19 13	1,300	19 $27\frac{8}{13}$	1,582
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	20 $8\frac{4}{12}$	1,794	17 19	1,175	19 $46\frac{1}{13}$	1,746

OAT PLOTS.

The quantity of seed sown per acre on the oat plots, was 2 bushels in 1889 and 1890; 1½ bushels in 1891, 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898, 1899, 1900 and 1901. The varieties used were as follows: In 1889, Early English; in 1890, 1891, 1892, 1893, Prize Cluster; and in 1894, 1895, 1896, 1897, 1898, 1899, 1900 and 1901, Banner. In 1901 the Banner was sown April 30, came up May 8, and the plots were harvested from August 1 to 5.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, $\frac{1}{10}$ ACRE EACH.

Number of Plot.	Fertilizers applied each Year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years.		13th Season, 1901. Variety, Banner.		Average Yield for Thirteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then.....	50 $26\frac{8}{12}$	3,168	52 22	3,790	50 $31\frac{2}{13}$	3,216
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then...	55 $18\frac{6}{12}$	3,372	53 18	3,805	55 $13\frac{6}{13}$	3,405
3	Unmanured from the beginning.....	31 $33\frac{1}{12}$	1,523	48 3	2,635	33 $7\frac{3}{13}$	1,609
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizers have been applied since then.....	31 $22\frac{7}{12}$	1,688	48 28	2,660	32 $33\frac{6}{13}$	1,763
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.....	48 $32\frac{2}{12}$	2,679	51 31	2,600	49 $5\frac{3}{13}$	2,673
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then	47 $7\frac{10}{12}$	2,615	53 23	3,570	47 $24\frac{9}{13}$	2,688
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.....	47 $29\frac{6}{12}$	3,150	56 31	3,415	48 $19\frac{5}{13}$	3,170
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.....	41 6	2,371	51 24	3,170	42 $7\frac{5}{13}$	2,432
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been used since then	36 $14\frac{9}{12}$	1,930	42 2	2,155	36 $29\frac{6}{13}$	1,947
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	47 $7\frac{5}{12}$	2,731	45 25	2,595	47 $3\frac{7}{13}$	2,721
11	Mineral superphosphate, No. 1, 350 lbs. nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. No fertilizers have been applied since then...	36 $31\frac{7}{12}$	2,414	49 29	27 55	37 $31\frac{5}{13}$	2,440

SESSIONAL PAPER No. 16

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, $\frac{1}{10}$ ACRE EACH—*Continued.*

Number of Plot.	Fertilizers applied each Year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years.		13th Season, 1901. Variety. Banner.		Average Yield for Thirteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
12	Unmanured from the beginning.....	21 $25\frac{7}{12}$	1,455	30 15	12 70	22 $14\frac{4}{13}$	1,431
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then.	34 $13\frac{7}{12}$	1,988	34 14	25 85	34 $13\frac{8}{13}$	2,034
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	39 $28\frac{7}{12}$	2,203	49 14	27 00	40 $19\frac{5}{13}$	2,241
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	47 $25\frac{4}{12}$	2,686	46 16	33 40	47 22	2,736
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then.	36 $14\frac{4}{12}$	2,117	52 32	27 00	37 $23\frac{7}{13}$	2,162
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1849, inclusive. No fertilizers have been applied since then.	44 $11\frac{1}{12}$	2,906	50 20	23 00	44 $27\frac{6}{13}$	2,859
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then..	36 $6\frac{6}{12}$	2,044	48 28	17 70	37 $5\frac{7}{13}$	2,023
19	Common salt (Sodium chloride) 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then.....	35 $28\frac{9}{12}$	1,923	47 32	21 60	36 $26\frac{5}{13}$	1,941
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers have been applied since then	33 $9\frac{3}{12}$	1,968	41 6	18 20	33 $29\frac{12}{13}$	1,957
12	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizers have been applied since then.....	34 $17\frac{9}{12}$	1,828	40 20	21 60	34 $33\frac{8}{13}$	1,854

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk, or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was tested under No. 1. The Mammoth Southern Sweet was tried in 1888, 1889 and 1890. In 1891 the Red Cob Ensilage was used, and in 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899 and 1901 a free growing Flint variety, the Rural Thoroughbred White Flint, was tested. On the other half of the plot (No. 2) the Canada Yellow Flint was used in 1888, 1889 and 1890, the Thoroughbred White Flint in 1891, Pearce's Prolific in 1892, 1893 and 1894, and the Mammoth Eight Rowed Flint in 1895, 1896, 1897, 1898, 1899 and 1901. For the first four years the No. 1 series was planted in drills 3 feet apart,

using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way and 4 or 5 kernels in a hill. During the past seven years both sorts have been grown in hills.

In 1900 no crop of Indian corn was grown on these plots, but clover was sown in their place on May 5 in the proportion of twelve pounds per acre. This made a strong growth was cut twice during the season and left on the ground to decay so that when ploughed under the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 20, 1901, by which time it had made a very heavy growth. It was then ploughed under about six inches deep, and harrowed well before the corn was planted. The corn in both series of plots was planted in 1901, on May 25, and cut for ensilage on September 12.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, $\frac{1}{10}$TH ACRE EACH, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted.	Average Yield for Twelve Years.				13th Season, 1901.				Average Yield for Thirteen Years.			
		½ Plot No. 1—weight of green fodder		½ Plot No. 2—weight of green fodder		½ Plot No. 1—Thoroughbd White Flint weight of green fodder		½ Plot No. 2—Mam. 8 rowed, weight of green fodder		½ Plot No. 1—weight of green fodder		½ Plot No. 2—weight of green fodder	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons	lbs.	Tons	lbs	Tons	lbs.	Tons	lbs	Tons	lbs.	Tons	lbs
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre, each year from 1888 to 1898 inclusive. No manure has been applied since then..	15	1,233	12	131	23	1,810	21	200	16	508	12	1,521
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre each year from 1888 to 1898 inclusive. No manure has been applied since then.....	16	1,323	10	1,809	17	100	17	1,480	16	1,383	11	860
3	Unmanured from the beginning.....	7	323	5	410	9	520	6	1,810	7	646	5	672
4	Mineral phosphate, untreated, finely ground, 800 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' Phosphate was used. No fertilizers have been applied since then.....	6	1,840	4	305	18	1,600	15	1,320	7	1,668	5	75
5	Mineral phosphate, untreated, finely ground, 800 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 800 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.....	10	932	8	1,408	22	100	16	1,740	11	714	9	664
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then...	15	1,534	11	120	25	810	24	10	16	1,017	12	112
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.....	14	1,347	10	1,380	25	1,020	19	1,210	15	1,014	11	752

EXPERIMENTS WITH FERTILIZERS, ON PLOTS OF INDIAN CORN—*Concluded.*

No of plot.	Fertilizers applied each year, from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted.	Average Yield for Twelve Years.				13th Season, 1901.				Average Yield for Thirteen Years.			
		½ Plot No. 1—weight of green fodder		½ Plot No. 2—weight of green fodder		½ Plot No. 1—Thoroughb'd White Flint, weight of green fodder		1 Plot No. 2—Mam. 8 rowed, weight of green fodder		½ Plot No. 1—weight of green fodder		1 Plot No. 2—weight of green fodder	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs	Tons.	lbs.	Tons	lbs
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive, In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.....	11	279	8	456	24	550	22	1,640	12	300	9	701
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then.....	10	264	7	1,309	26	1,600	23	110	11	828	8	1,678
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	12	1,854	10	39	25	20	20	1,200	13	1,713	10	1,667
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizers have been applied since then..	15	944	11	1,146	28	1,800	23	1,310	16	1,010	12	1,005
12	Unmanured from the beginning.....	10	202	8	500	23	610	19	800	11	233	9	215
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	11	327	8	1,115	24	760	20	1,400	12	360	9	1,011
14	Bone, finely ground 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	11	1,461	8	1,497	24	1,700	22	620	12	1,482	9	1,583
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	12	384	9	607	22	1,430	18	800	13	3	10	7
16	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers have been applied since then..	12	1,009	9	1,239	23	600	20	300	13	662	10	859
17	Mineral superphoshate, No. 1, 600 lbs.; muriate of potash, 200 lbs.; sulphate of ammonia, 150 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	12	1,297	8	1,773	25	1,590	23	110	13	1,320	9	1,953
18	Muriate of potash, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	8	1,138	5	1,534	25	1,260	21	960	9	1,762	6	1,951
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90; (muriate of potash, 200 lbs., substituted each year since); dried blood, 300 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizers have been applied since then..	11	458	7	1,225	25	1,830	23	940	12	717	8	1,665
20	Wood ashes, unleached, 1,960 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.	9	1,016	6	1,841	26	800	22	1,500	10	1,615	8	276
21	Bone, finely ground, 500 lbs.; sulphate of ammonia, 200 lbs.; muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..... ..	12	222	6	692	23	750	21	840	12	1,955	7	1,011

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under, so that the plant food they have taken from the soil may be returned to it. One-half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips, and these crops have been alternated from year to year. The preparation of the land has been the same for both these roots. It was ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barnyard manure had been spread on plots 1, 2 and 6, and after gang-ploughing the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

In 1889, the variety of mangel used was the Mammoth Long Red. In 1890, three varieties were sown: 15 rows of Mammoth Long Red, 6 of Mammoth Long Yellow, and 6 of Golden Intermediate on each plot. In 1891, each plot again had three varieties: 18 rows of Mammoth Long Red, 3 of Yellow Fleshed Tankard, and 6 of Golden Tankard. In 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899 and 1901, one variety only was used, namely, the Mammoth Long Red. About 4 pounds of seed were sown per acre each year.

Two varieties of turnips were sown on the half plots devoted to these roots in 1889; 25 rows of Carter's Prize Winner, and 2 rows of Carter's Queen of Swedes, and in 1890, a single variety, Carter's Elephant Swede. In 1891, six varieties were sown; 6 rows of Lord Derby Swede, 4 of New Giant King, 3 of Imperial Swede, 6 of Champion Swede, 4 of Purple Top Swede, and 4 of East Lothian Swede. In 1892 the Improved Purple Top Swede only was sown, in 1893 and 1894 the Prize Purple Top Swede, in 1895 the Imperial Swede, and in 1896, 1897, 1898, 1899 and 1901 the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner and the fertilizers spread on it at the same time as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. About three pounds of seed were sown per acre.

In 1900 no crops of mangels and turnips were grown, but clover was sown in their place on May 5 in the proportion of twelve pounds per acre. This made a strong growth, and was cut twice during the season, and left on the ground to decay so that when ploughed under the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 10, 1901, by which time it had made a very heavy growth. It was then ploughed under about six inches deep and harrowed well, then made up into ridges two feet apart. These were rolled with a hand roller, which flattened the ridges considerably and made a firm, even seed bed. It is proposed to alternate the crops of clover and roots in this way for some years for the purpose of gaining information as to the fertilizing effect of crops of green clover ploughed under on land to be used for growing roots.

In 1901 the mangels were sown on May 13, and pulled on October 14; the turnips were sown May 22, and pulled October 22. The yield per acre has been calculated in each case from the weight of roots gathered from two rows, each 66 feet long.

EXPERIMENTS WITH FERTILIZERS ON ROOTS; PLOTS OF MANGELS AND TURNIPS $\frac{1}{10}$TH ACRE EACH.

No. of Plot.	Fertilizers applied each Year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown.	Average Yield for Eleven Years.		12th Season, 1901. Varieties.				Average Yield for Twelve Years.			
				West Half Plot.		East Half Plot.					
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red: Weight of Roots.		Turnips, Purple Top Swede: Weight of Roots.		Mangels, Weight of Roots.		Turnips, Weight of Roots.	
		Per Acre.		Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 20 tons per acre each year from 1889 to 1898 inclusive. No manure has been applied since then.....	22	1,174	15	183	22	160	21	320	22	1,089	15	1,194
2	Barn-yard manure (mixed horse and cow manure) fresh, 20 tons per acre each year from 1889 to 1898 inclusive. No manure has been applied since then.....	21	1,090	15	607	21	500	20	1,590	21	1,041	15	1,522
3	Unmanured from the beginning.....	8	1,587	6	1,863	9	1,610	12	1,820	8	1,756	7	859
4	Mineral phosphate, untreated, finely ground, 1,600 lbs. per acre, used each year from 1889 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' Phosphate was used. No fertilizers have been applied since then.....	8	644	7	593	9	940	14	1,520	8	835	7	1,837
5	Mineral phosphate, untreated, finely ground, 1,000 lbs., nitrate of soda, 250 lbs. wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then.	13	1,732	9	1,436	19	350	13	1,130	14	617	10	77
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate untreated, finely ground, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1889 to 1897 inclusive. In 1898 1,000 lbs. of Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then..	17	1,799	13	536	20	1,380	11	1,800	18	264	13	308
7	Mineral phosphate, untreated, finely ground, 1,000 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 1,000 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizers have been applied since then....	10	1,472	9	1,012	16	440	10	1,650	11	386	9	1,232
8	Mineral superphosphate, No. 1, 500 lbs.; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	13	1,725	11	1,730	13	820	15	1,720	13	1,649	12	396

EXPERIMENTS WITH FERTILIZERS ON ROOTS; PLOTS OF MANGELS AND TURNIPS—*Concluded.*

No. of plot.	Fertilizers applied each Year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1900 in place of the roots and ploughed under in May, 1900, before the roots were sown.	Average Yield for Eleven Years.		12th Season, 1901, Varieties.				Average Yield for Twelve Years.			
				West Half Plot.		East Half Plot.					
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Mangels, Mammoth Long Red: Weight of Roots.		Turnips, Purple Top Swede: Weight of Roots.		Mangels, Weight of Roots.		Turnips, Weight of Roots.	
		Per Acre.	Per Acre.	Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons. lbs.	Tons. lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..	9 120	8 1,327	10	770	15	1,180	9	341	9	481
10	Nitrate of soda, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	14 520	9 134	13	220	15	700	14	328	9	1,181
11	Sulphate of ammonia, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	10 145	10 667	12	860	16	1,250	12	538	10	1,715
12	Unmanured from the beginning	7 354	6 1,677	7	1,490	11	1,340	7	449	7	482
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then..... . .	10 196	8 616	12	1,950	13	850	12	675	8	1,469
14	Wood ashes, unleached, 2,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	10 1,508	7 1,107	13	40	13	1,060	10	1,886	8	103
15	Common salt (Sodium chloride) 400 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.. ...	9 961	7 21	12	680	12	900	9	1,437	7	927
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	13 589	10 711	10	690	17	1,080	13	173	10	1,908
17	Mineral superphosphate, No. 1, 350 lbs ; wood ashes, unleached, 1,500 lbs per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then ..	12 985	9 31	16	660	20	690	12	1,624	9	1,919
18	Mineral superphosphate, No. 1, 500 lbs.; muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then.....	12 415	9 1,900	19	60	19	200	12	1,552	10	1,425
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since); dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then	13 1,150	11 737	20	1,460	17	1,950	14	342	11	1,838
20	Wood ashes, unleached, 1,500 lbs.; common salt (Sodium chloride), 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then...	14 202	10 183	20	700	19	53	14	1,244	10	1,712
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers have been applied since then...	14 1,190	10 903	16	600	17	680	14	1,482	11	51

DISTRIBUTION OF SAMPLES OF SEED GRAIN, ETC., TO FARMERS FOR TRIAL.

Another distribution was made in the spring of 1901, consisting of samples of the most promising sorts of oats, spring wheat, barley, pease, Indian corn and potatoes. By the careful growing of one of these samples, the product will soon be sufficient to sow a large area, and thus in a short time the farmer can provide himself with some of the best sorts, without cost beyond that of his own labour. From the large number of appreciative letters received from farmers who have had these samples and have grown from them the seed grain they are now using on their farms, it is evident that this branch of the work of the experimental farms is doing a vast amount of good, and is rapidly accomplishing the object for which it was instituted, namely, the general introduction among farmers throughout the Dominion of the best and most productive sorts of these important farm crops. Another proof of the appreciation in which this distribution is held is the very large demand each year for such samples.

The samples sent out from the Central Experimental Farm during the early months of 1901 were distributed as follows:—

Name of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
Oats	371	763	1,012	2,589	1,304	1,422	640	87
Barley	105	278	280	734	305	321	143	27
Wheat	271	381	789	1,856	515	474	243	28
Pease	74	376	337	654	419	627	343	59
Indian corn	27	156	85	451	429	167	56	15
Potatoes	147	511	1,058	1,400	1,256	1,045	460	189
Total	995	2,465	3,561	7,684	4,228	4,056	1,885	405

Total number of samples distributed 25,279
Number of applicants supplied 25,231

The following list shows the number of 3-pound packages of the different varieties which have been sent out :—

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		BARLEY.	
Improved Ligowo	2,325	*Six-rowed.*	
Banner	1,181		
Siberian	1,115	Mensury	840
American Beauty	897	Royal	566
Golden Beauty	798	Odessa	228
Bavarian	795	Oderbruch	117
Abundance	403		
Wide Awake	354		
Bonanza	120	*Two-rowed.*	
White Schonen	103		
Tartar King	91	Sidney	354
Waverley	3	Canadian Thorpe	58
Goldfinder	3	French Chevalier	30
Total	8,188	Total	2,193

Name of Variety.	Number of Packages.
Wheat.	
Red Fife	1,151
Preston	916
White Fife	560
White Connell	539
Stanley	484
Percy	392
Wellman's Fife	238
Monarch	191
Hungarian	69
Dufferin	17
Total	4,557
Pease.	
Prussian Blue	675
Large White Marrowfat	533
Canadian Beauty	498
French Canner	486
Creeper	311
Black Eyed Marrowfat	237
Golden Vine	149
Total	2,889
Indian Corn.	
Selected Leaming	492
Longfellow	284
Angel of Midnight	125
White Cap Yellow Dent	119
Early Butler	89
Early Mastodon	78
Mitchell's Early	72
Mammoth Cuban	54
Champion White Pearl	39
Compton's Early	34
Total	1,386
Potatoes.	
Carman No. 1	850
American Wonder	752
Early Sunrise	718
Potatoes—*Con.*	
Everett	625
Early Harvest	519
Empire State	466
Burnaby Seedling	458
Rochester Rose	402
Early Rose	165
Sir Walter Raleigh	109
Canadian Beauty	102
Early Andes	101
Early White Prize	97
Bovee	96
Uncle Sam	95
Vigorosa	92
New Queen	91
Honeoye Rose	77
Prolific Rose	76
Prize Taker	65
Wonder of the World	23
Early Six Weeks	14
Rose of the North	10
Beauty of Hebron	8
Gem of Aroostook	7
Holborn Abundance	7
Brown's Rot Proof	3
White Elephant	2
Maggie Murphy	2
Irish Daisy	2
Lizzie's Pride	2
Dakota Red	2
Early Norther	2
Sharpe's Seedling	2
State of Maine	2
Late Puritan	2
Additional varieties of which only one sample of each was sent	20
Total	6,066
Total number of packages distributed :—	
Wheat	4,557
Oats	8,188
Barley	2,193
Pease	2,889
Corn	1,386
Potatoes	6,066
Total	25,279

DISTRIBUTION OF SAMPLES OF GRAIN SUFFICIENT FOR ONE-TENTH OF AN ACRE.

The distribution of grain in larger samples sufficient in each case for a one-tenth acre plot was begun in 1899, and continued in 1900 and 1901. These samples were sent to a special list of farmers selected from among those who have shown a special interest in this important work. In preparing the list for this purpose the names have been chosen from every part of the Dominion so that every agricultural constituency has been represented.

These special samples to the number of 2,858 have been distributed by provinces as follows:—

DISTRIBUTION of samples of grain sufficient for one-tenth of an acre.

Name of Grain.	P. E. I.	N. S.	N. B.	Quebec.	Ontario.	Man.	N.W.T.	B. C.
Oats	58	151	164	655	847	112	69	24
Spring Wheat	41	37	91	193	72	19	12	5
Barley	15	21	33	127	77	27	6	2
Total	114	209	288	975	996	158	87	31

The following list shows the number of these larger packages of the different varieties which have been sent out:—

Name of Variety.	Number of Packages.
OATS.	
Waverley	465
Tartar King	411
Improved Ligowo	346
American Beauty	288
Banner	237
Golden Beauty	128
Siberian	110
Goldfinder	94
Total	2,079
WHEAT.	
Preston	251
Percy	122
Stanley	94
Red Fife	2
WHEAT—*Con.*	
Wellman's Fife	2
Total	471
BARLEY.	
Mensury	199
Royal	109
Total	308
Oats	2,079
Wheat	471
Barley	308
Total	2,858

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples of three pounds each were also distributed from the branch experimental farms as follows:—

Experimental Farm, Nappan, N.S.—		Potatoes	652
Oats	260		1,629
Wheat	89		
Barley	78		
Pease	22		
Buckwheat	10	Experimental Farm, Brandon, Man.—	
Winter Rye	8	Samples of grain of all sorts	555
Potatoes	278	Potatoes	334
	745		889
Experimental Farm, Indian Head, N. W.T.—		Experimental Farm, Agassiz, B.C.—	
Oats	414	Oats	246
Barley	68	Barley	184
Wheat	252	Wheat	168
Pease	200	Pease	87
Flax, Rye, &c	43	Potatoes	259
			944

These samples added to the number distributed by the Central Experimental Farm make a total of 32,344. It is gratifying to find that farmers generally are paying much more attention than formerly to the selection of the best and most productive sorts for seed.

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS FOR 1901.

The number of samples of seed grain and other seeds which were tested during the season of 1901 to ascertain the proportion which would germinate was 2,385. Many of the samples sent for test are much below the average in vitality, and for this reason do not fairly represent the vitality of grain of average quality grown in different parts of the Dominion. The main object in continuing these tests from year to year is to give farmers the opportunity of having any samples which may be of doubtful vitality, through injury during harvesting or storing, thoroughly tested so that their value for seed purposes may be known. Samples may be sent free through the mail, about one ounce is sufficient and the work is done and reported on free of charge. The vitality of samples can usually be ascertained within a fortnight after they are received.

RESULTS OF TESTS OF SEEDS FOR VITALITY, 1900-1.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	900	100·0	8·0	78·5	5·7	84·2
Barley	312	100·0	11·0	78·0	7·5	85·5
Oats	972	100·0	0·0	82·5	5·4	87·9
Rye	2	85·0	4·0	41 5	3·0	44·5
Peas	90	98·0	14 0			84·0
Corn	12	100 0	2·0			67·0
Grass	14	97·0	14·0			59·7
Clover	6	80·0	6·0			41·5
Flax	9	88·0	12·0			49·1
Carrots	17	82·0	11·0			41 0
Turnips	8	82·0	8·0			53·0
Mangels	10	86·0	60·0			73·2
Sugar Beets	9	98·0	34·0			75·1
Radish	11	94·0	46·0			73 5
Cabbage	6	81·0	13·0			59·1
Beans	2	72·0	0·0			36 0
Tobacco	2	32·0	31·0			31·5
Canary Seed	1	62·0	62·0			62·0
Cucumber	1	42·0	42·0			42·0
Total number of samples tested, highest and lowest percentage	2,384	100·0	0·0			

(Signed) WILLIAM T. ELLIS.

TABLE showing the Results of Grain Tests for each Province.

ONTARIO.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	179	100·0	19·0	60·3	11·8	72·2
Barley	112	100·0	11·0	72·2	11·3	83·5
Oats	181	100·0	47·0	90·6	4·2	94·8

QUEBEC.

Wheat	56	100·0	27·0	82·5	5·3	87·9
Barley	17	100·0	64·0	83·3	6·3	89·7
Oats	82	100·0	23·0	81·7	5·5	87·2

MANITOBA.

Wheat	441	100·0	8·0	83·0	4·2	87·2
Barley	121	100·0	21·0	82·0	5·0	87·0
Oats	376	100·0	26·0	84·6	5·6	90·3

NORTH-WEST TERRITORIES.

Wheat	154	100·0	39·0	82·2	3·5	85·7
Barley	38	100·0	39·0	75·1	6·2	81·3
Oats	229	100·0	0·0	68·8	6·9	75·7

NOVA SCOTIA.

Wheat	25	100·0	52·0	82·4	5·0	87·4
Barley	15	99·0	78·0	83·6	6·3	89·9
Oats	31	100·0	81·0	89·9	3·1	93·1

NEW BRUNSWICK.

Wheat	26	100·0	59·0	87·2	4·0	91·2
Barley	4	100·0	97·0	97·5	1·2	98·7
Oats	32	100·0	85·0	90·9	4·2	95·2

PRINCE EDWARD ISLAND.

Wheat	16	98·0	72·0	82·6	5·1	87·7
Barley	5	98·0	72·0	81·0	8·4	89·4
Oats	40	100·0	76·0	92·5	3·6	96·1

BRITISH COLUMBIA.

Wheat	3	99·0	95·0	96·3	0·3	96·6
Barley	0	0·0	0·0	0·0	0·0	0·0
Oats	1	94·0	94·0	91·0	3·0	94·0

METEOROLOGICAL OBSERVATIONS.

Table of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1901; maximum, minimum and mean temperature for each month, with date of occurrence, also rainfall and snowfall and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days, Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		in.	in.	in.		in.	
Jan	21·30	0·59	20·54	10·86	38·8	16th	—25·5	20th	0·17	32·50	3·42	18	1·30	12th
Feb.....	19·84	0·62	19·21	10·22	29·5	19th	—11·8	3rd	0·00	14·00	1·40	7	0·60	4th
March...	32·30	15·13	17·16	23·71	40·5	24th	— 9·5	3rd	1·65	22·25	3·87	18	0·71	27th
April	55·78	36·70	19·08	46 24	79·8	28th	5·0	3rd	3·82	1·50	3·97	16	0·74	4th
May.....	67·07	46·66	20·37	56·84	81·2	8th	36·0	15th	4·36	.....	4·36	17	0·95	18th
June.....	78·56	55·52	23·03	67·03	96·8	28th	42·8	8th	3·79	.....	3·79	12	1·02	23rd
July.. ..	82·36	59·86	22·49	71·10	99·0	16th	47·9	25th	4·44	.....	4·44	14	1·48	30th
August ..	79·58	57·13	22·44	68·35	89·8	12th	49·2	5th	3·12	.....	3·12	14	1·44	10th
Sept.	70·95	49·55	21·40	60·25	90·0	5th	33·0	20th	2·98	.. ..	2·98	8	1·17	29th
October..	56 81	38·16	18·65	47·48	72·0	12th	24·8	25th	1·63	s	1·63	12	0·45	19th
Nov.....	34·69	21·78	13·00	28·28	58·0	1st	— 3·0	29th	1·30	13·75	2·67	16	0·83	25th
Dec.....	26·34	11·35	14·98	18·84	53·0	14th	—14·3	16th	1·95	13·25	3·26	15	1·55	15th
									29·21	97·25	38·91	167		

Rain or snow fell on 167 days during the 12 months.

Heaviest rainfall in 24 hours, 1·48 inches on July 30.

Heaviest snowfall in 24 hours, 13·00 inches on January 12.

It will be seen the highest temperature during the 12 months was 99° ·0 on July 16.

The lowest temperature during the 12 months was—25° ·5 on January 20.

During the growing season rain fell on 16 days in April, 17 days in May, 12 days in June, 14 days in July, 14 days in August, and 8 days in September.

September shows the lowest number of days on which rain fell, viz., 8.

Rain or snow fell on 18 days in January and March.

Total precipitation during the 12 months, 38·91 inches, as compared with 40·27 inches during 1900.

RAINFALL, Snowfall and total Precipitation from 1890 to 1901, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	In inches.	In inches.	In inches.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27 01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	36·02
1899	33 86	77·25	41·63
1900	29·48	108 00	40·27
1901	29·21	97·25	38·91
Total	323·56	1,058·35	429·45
Yearly average for 12 years	26·96	88·19	35·78

RECORD of Sunshine at the Central Experimental Farm, Ottawa, for the Years 1898, 1899, 1900 and 1901.

Months.	1898.				1899.				1900.				1901.			
	Number of days with Sunshine.	Number of days without Sunshine	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine	Total hours Sunshine.	Average Sunshine per day.
January...	21	10	97·4	3·14	18	13	91·2	2·94	18	13	76·4	2·46	20	11	94·6	3·05
February..	15	13	67·5	2·41	19	9	102·1	3·64	20	8	110·2	3·93	20	8	120·9	4·31
March.....	26	5	171·5	5·53	17	14	124·1	4·00	26	5	177·9	5·73	19	12	82·4	2·65
April	29	1	233·8	7·79	26	4	228·8	7·62	26	4	212·7	7·09	18	12	137·1	4·57
May.....	30	1	186·3	6·01	27	4	225·4	7·27	27	4	241·6	7·79	25	6	200·8	6 47
June.....	29	1	184·9	6·16	29	1	257·1	8·57	27	3	282·2	9·40	29	1	269·4	8·98
July.....	30	1	272·8	8·80	29	2	271·3	8·75	29	2	225·1	7·26	29	2	245·8	7·92
August....	Instruments out of order.				31	0	271·2	8·74	30	1	270·7	8·73	29	2	226·1	7·29
September..	27	3	166·9	5·23	22	8	128·9	4·29	22	8	164·4	5·48	26	4	202·3	6·74
October....	21	10	196·0	3·41	23	8	120·4	3·88	26	5	148·7	4·79	27	4	126·3	4·07
November..	21	9	91·3	3·04	17	13	77·0	2·56	18	12	71·7	2·39	19	11	72·4	2·41
December...	15	16	54·3	1·75	17	14	50·1	1.61	16	15	34·0	1·09	16	15	45·4	1·46

(Signed) WILLIAM T. ELLIS,
Observer.

CORRESPONDENCE.

The great volume of correspondence continually passing between Canadian farmers and the officers of the Experimental Farms is a gratifying evidence of the usefulness of the work conducted and of the appreciation in which it is held. A large proportion of the letters received are letters of inquiry from correspondents seeking information on all sorts of farm subjects.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters received and sent out at the Central Experimental Farm from November 30, 1900, to November 30, 1901, also the number of reports, bulletins and circulars forwarded by mail during the same period:—

	Letters received.	Letters sent.
Director.....	35,711	17,094
Agriculturist.....	1,470	1,533
Horticulturist	1,163	1,209
Chemist	1,213	1,127
Entomologist and Botanist	3,058	2,840
Poultry Manager	1,575	1,078
Accountant	1,123	1,293
	45,313	26,174

A large number of letters received by the Director are applications for the publications of the farms or for samples of grain. A considerable proportion of these are

answered by sending the correspondents the material asked for. This will explain why the number received so much exceeds the number sent out.

Circular letters sent, including circulars sent with samples of seed grain	34,160
Reports and bulletins mailed	257,617

BRANCH EXPERIMENTAL FARMS.

The correspondence with the superintendents of the branch experimental farms is also large as will be seen from the following figures:—

	Letters received.	Letters sent.
Experimental Farm, Nappan, N.S.	1,416	1,211
Experimental Farm, Brandon, Man.	4,804	2,755
Experimental Farm, Indian Head, N.W.T.	5,410	5,333
Experimental Farm, Agassiz, B.C.	2,518	2,378
	14,148	11,677

Much additional information has also gone out from the branch farms in printed circulars.

Adding the correspondence received at the Branch Experimental Farms to that of the Central Farm, we find that 59,461 letters were received, and 36,851 sent out during the past year in addition to the vast amount of information distributed in reports, bulletins and circulars.

EXPERIMENTS IN TREE PLANTING ON SABLE ISLAND.

Sable Island lies in the Atlantic about 90 miles east from the nearest point in Nova Scotia, and about 153 miles from Halifax. In form it is a long, slender, open crescent with the hollow side facing the mainland and running out to a point at either end. It is about 21 miles long, and at its widest parts is more than a mile across; a good portion of the middle of the island is occupied by a lagoon of salt water known as Lake Wallace, which at some points covers nearly half the width of the island and extends for more than half its length. A break has occurred in the south bar which forms the southern boundary of this lagoon through which the sea water enters in considerable volume.

WASTING OF THE ISLAND BY THE ACTION OF THE SEA.

The island consists in the main of white sand forming banks and hills of varying height. The strong winds which prevail at certain periods, sometimes play havoc with these sandy elevations, thus continually altering the configuration of the land. The sea has made great inroads on the west end of the island and has within the memory of the present residents washed away several miles of that end which has made it necessary to remove the lighthouse there twice within fifteen years. Early surveys give the length of the island as about 40 miles, and two miles or more in width, showing that great waste has occurred. Dangerous shoals and sand bars extend on all sides, and the strong ocean currents from the south and the north which set in about the island, often carry vessels out of their course. Add to this the prevalence of fogs which obscure the land from view and you have a combination of dangerous conditions which have brought about the destruction of many good ships and involved the loss of hundreds of lives.

MANY DISASTROUS WRECKS.

The appalling loss of life and property which has occurred in this dangerous spot early led to the establishment there of life saving stations. These were organized by the government of Nova Scotia in 1801, and maintained by that province until confederation took place, when this service was undertaken by the Dominion. The British government contributes £500 a year towards the cost of carrying on this good work.

Many disastrous wrecks have occurred here. The first of these recorded was in 1583, when the *Admiral,* a vessel in the navy of Queen Elizabeth, was wrecked and nearly 100 lives lost. Up to the present time no less than 171 known wrecks have occurred. The last wreck of importance, comparatively speaking, was that of the steamship *Moravian,* from Antwerp to Boston. This was a vessel of 2,000 tons, which struck on a sand bar on the 12th of February, 1899, and broke up the following June. There were 40 persons on this steamship, 21 of whom reached the island in their own boats, while 19 were rescued by the island lifeboats. No one was drowned in this instance, but one man died from the effects of exposure. It has been truly said that 'no other island on this globe can show so appalling a record of shipwreck and disaster.'

THE ISLAND TREELESS.

There are no trees on Sable Island to break the force of the winds, which sometimes blow fiercely and raise dense clouds of drifting sand. The gradual wasting of the island and the lessening of its surface has led to the consideration of the possibility of establishing tree growth there, that thus the land might become more fixed and further lessening of the surface be retarded if not prevented.

INVESTIGATIONS LOOKING TO TREE PLANTING.

During the early part of 1900, I was requested by the Minister of Marine and Fisheries, Sir Louis Davies, to consider the subject of a somewhat extensive experiment in tree planting on Sable island, and if this was thought feasible to make the necessary arrangements to obtain a sufficient number of such trees as would be desirable for that purpose. Having obtained the ready concurrence of the Hon. Minister of Agriculture to devote such time as was necessary to carry out this object, steps were taken to gain information on the subject. From the outset I have had the hearty cooperation of the deputy minister, Lieut.-Col. F. F. Gourdeau, who has been most enthusiastic in the work, and has been of the greatest assistance to me. During my visit to the Paris Exposition in 1900, a journey was made to the sea coast of Brittany with Lieut.-Col. Gourdeau to see the results of the planting of pine forests there on the drifting sands on the ocean shore, to gain information as to the methods adopted in planting and the varieties of trees which have been successfully grown.

We found large districts planted with pine trees growing thriftily, although slowly, on what 50 or 60 years ago was a bare and barren coast covered with drifting sand. Formerly houses and villages were at times engulfed by these terrible drifts, but under the influence of this successful planting, the drifting of the sand has long since ceased and a soil is gradually, though slowly, forming mainly through the decay of successive crops of the needle-like leaves of the pines. A careful survey of the district showed that the trees were almost all of one species known as the maritime pine *Pinus pinaster* (*P. maritima*) known also in Europe as the cluster pine. In that locality it is a rather small growing tree with large long leaves and very large cones. The trees throughout the district of country visited between St. Nazaire and Baule seemed to range from 20 to about 50 years of age ; their height was from 15 to 25 feet, and the trunks of some of the larger specimens, when measured, three feet from the ground showed a diameter of about 12 inches. Specimens of other species of pine were occasionally found growing

with the maritime pine especially *Pinus sylvestris,* and notes were taken on these as to their comparative vigour of growth on the apparently pure sand of the district. A careful study was also made of other varieties of trees and shrubs seen growing here and there on that soil, and a complete list made with notes on their growth. The information thus gained was subsequently used to good purpose when selecting the material to be tested on Sable Island.

VISIT TO NORMANDY.

I also made a journey to the district of Calvados in Normandy, which is known throughout the world among nurserymen for its large tree-growing establishments, where an immense number of young forest trees are produced. With an excellent climate for this purpose, cheap labour and long hours for work, and the employment of the best methods, young trees are produced there of thrifty growth in millions, and with such advantages they can be supplied at very low rates. The stock of one of the larger nurseries was inspected and plenty of suitable material found. The maritime pine especially was grown in very large quantities, as this tree is extensively planted in many parts of France. Many other species of pine and other evergreen trees were also available there with a large assortment of deciduous trees and shrubs.

SELECTION OF SUITABLE VARIETIES.

On returning to Ottawa a list of such sorts as were likely to be suitable was prepared with quantities desired. The trees and shrubs chosen included a large number of those which have succeeded well in drifting sands in France to which were added a number of other varieties which from Canadian experience were likely to prove useful for that purpose. Small lots of many other species were added to lend interest to the collection and to test their hardiness and adaptability to the climate of Sable Island. This list included in all 68,755 evergreens of 25 varieties, and 12,590 deciduous sorts of 79 varieties, a total of 81,345, made up as follows:—

TREES BROUGHT FROM FRANCE.

Number	Name.	Number	Name.
	Evergreens.	10	*Cupressus pisifera filifera*, Thread-like Retinospora.
10,000	*Pinus pinaster* = *P. maritima*, Maritime or Cluster Pine.	10	" " *plumosa*, Plumose Retinospora.
10,000	" *sylvestris*, Scotch Pine.	10	" " *plumosa aurea.*
10,000	" " *rigaensis*, Riga Pine.	25	*Taxus baccata*, European Yew.
10,000	" *Laricio nigricans*, Austrian Pine.		
5,000	" *Montana*, Mountain Pine.		*Deciduous Trees and Shrubs.*
2,500	" *Montana Mughus*, Dwarf Mountain Pine.	500	*Acer Negundo*, Box Elder.
2,500	" *strobus*, White Pine.	500	" *platanoides*, Norway Maple.
100	" *rigida*, Pitch Pine.	10	" " *Schwedleri*, Schwedler's Norway Maple.
50	" *cembra*, Stone Pine.	50	" *saccharinum*, Sugar Maple.
10,000	*Abies excelsa*, Norway Spruce.	50	" *tataricum*, Tartarian Maple.
2,500	" *balsamea*, Balsam Spruce.	25	*Vitis (Ampelopsis) quinquefolia*, Virginia Creeper.
2,500	" *alba*, White Spruce.	10	" *Thunbergii*, Japan Ivy.
1,000	" *nigra*, Black Spruce.	5	*Aristolochia sipho*, Dutchman's Pipe.
1,000	*Juniperus virginiana*, Red Cedar.	25	*Berberis vulgaris foliis purpureis*, Purple Barberry.
1,000	" *communis*, Common Juniper.	10	" *Thunbergi*, Thunberg's Barberry.
500	*Thuya occidentalis*, arbor vitæ.	2,000	*Betula alba*, European White Birch.
10	" *columbia.*	10	" " *laciniata pendula*, Cut-leaved Birch.
10	" *Ellwangeriana.*		
10	" *globosa.*		
10	" *Hovegi.*		
10	" *lutea.*		

Scenes on Sable Island.

1. Landing place with lookout in the distance. 2. Young seal on the shore. 3. Residence of Superintendent.
4. Surfboat pulling through the breakers. 5. Lighthouse at East point. 6. Heeling in young forest trees.
7. Sand binding grass with plain of drifting sand beyond. 8. Surf boats on way to steamer for supplies.

TREES BROUGHT FROM FRANCE—*Concluded.*

Number	Name.	Number	Name.
	Deciduous Trees and Shrubs—Con.		*Deciduous Trees and Shrubs*—Con.
25	*Betula lutea*, Yellow Birch.	200	*Populus alba*, Silver Poplar.
25	" *nigra*, River Birch.	200	" *balsamifera*, Balsam Poplar.
10	*Tecoma grandiflora*, Trumpet Flower.	200	" *deltoidea (= P. monilifera).*
25	*Caragana arborescens*, Siberian Pea Tree.	200	" *nigra pyramidalis*, Lombardy Poplar.
25	*Catalpa Kempferi*, Japanese Catalpa.	500	*Prunus spinosa*, Black Thorn.
25	" *cordifolia*, Western Catalpa.	50	*Ptelea trifoliata*, Wafer Ash.
10	*Chionanthus virginica*, Fringe Tree.	100	*Pyrus aucuparia* Eur. Mountain Ash.
100	*Clematis Vitalba*, Traveller's Joy.	100	*Rhamnus catharticus*, Common Buckthorn.
25	*Cornus alba sibirica*, Siberian Dogwood.	100	" *frangula*, Alder Buckthorn.
10	" " *variegata*, Variegated Siberian Dogwood.	25	*Rhus cotinus*, Smoke Tree.
		50	Roses, Hybrid perpetuals, 10 varieties.
25	*Crataegus Oxyacantha*, English Hawthorn.	200	*Salix argentea*, Silver Willow.
10	" " *fl. rosea plena*, Double red-flowering English Hawthorn	200	" *laurina*, Laurel-leaved Willow.
		10	*Sambucus nigra aurea nova*, Golden Elder.
25	" *pyracantha.*	25	*Spiræa arguta.*
25	*Deutzia crenata*, Crenate Deutzia.	10	" *Japonica Bumalda*, Anthony Waterer
25	*Diervilla (Weigelia) florida.*	25	" *prunifolia.*
25	" *rosea.*	25	" *Van Houttei.*
10	*Elæagnus multiflora.*	10	*Syringa Japonica*, Japan Lilac.
625	*Euonymus Japonicus*, Japan Euonymus.	25	" *Josikaea*, Josika's Lilac.
25	*Forsythia suspensa*, Golden Bell.	25	" *chinensis*, Rouen Lilac.
500	*Fraxinus excelsior*, European Ash.	10	" *vulgaris*, Chas. Xth.
1,000	*Genista sagittalis = (G. Scoparia).*	10	" " *alba*, White Lilac.
2,000	*Gleditschia triacanthos*, Honey Locust.	25	" " de Marly.
10	*Halesia tetraptera*, Silver-bell Tree.	25	" " 6 named varieties.
200	*Hippophæ rhamnoides*, Sea Buckthorn.	500	*Ulmus americana*, American Elm.
25	*Hydrangea paniculata grandiflora*, Japanese Hydrangea.	25	*Viburnum Lantana*, Wayfaring Tree.
		25	" *Opulus sterilis*, Snowball.
500	*Juglans nigra*, Black Walnut.	10	*Wistaria magnifica.*
500	*Ligustrum amurense*, Amur Privet.		The following fruitbushes were included in this order :—
25	*Lonicera Belgica*, Belgian Honeysuckle.	50	Currants, White Dutch.
25	" *sempervirens*, Scarlet Trumpet Honeysuckle.	25	" Black, Lees Prolific.
25	" *tatarica grandiflora rubra*, Tartarian Honeysuckle.	25	Gooseberries in 4 varieties. This order also included 50 lbs. of the seed of the Maritime Pine, *Pinus pinaster.*
500	*Lycium Europeum*, Matrimony Vine.		

TREES, ETC., SENT FROM OTTAWA.

Some further material for planting was also taken from Ottawa. This included 1,000 cuttings of *Salix longifolia*, a willow with creeping roots, which grows luxuriantly on the banks of the Saskatchewan river at the Experimental Farm at Brandon. This willow promises to be a good soil binder. As supplementary to the supply of fruits, there were also the following:—

101 Currant bushes, red, white and black, in 23 varieties.
28 Gooseberries, in 5 varieties.
39 Raspberries, in 3 varieties.
254 Strawberries, in 12 varieties.
23 Dwarf June berry.
19 Sand Cherry.
13 Beach plums.
75 Pyrus baccata.
48 Pyrus prunifolia,

Also 6 *Elæagnus argentea* (Wolf willow), a small collection of rhubarb roots, a number of varieties of perennial flowering plants, and an assortment of seeds of trees, shrubs and plants of the hardiest sorts.

THE EXPEDITION STARTED.

As soon as the shipment of trees from Normandy had reached Halifax preparations were made for our departure. The party comprising the expedition was Lieut.-Col. F. F. Gourdeau, Deputy Minister Marine and Fisheries, Mr. W. E. Saunders, of London, Ont., Mr. Thomas Davies, of Ottawa, and myself. We arrived in Halifax on May 14 at 10 p.m., where we were met by Commander Spain, in charge of the government steamers, who informed us that the steamer *Minto* was in waiting with steam up and that everything was ready for an immediate start for Sable Island if we wished to go at once. After consultation we found this was not quite practicable, so we went on board and rested until morning. The obtaining of some additional supplies occupied the next morning, and it was 2 p.m. before the steamer left. When we got well out to sea we found a rather heavy swell, and as evening approached the captain decided that we could not reach the island that night so we headed for Liscombe harbour, which is about the nearest point on the mainland to Sable Island where we arrived about 9 p.m., finding there smooth water and good anchorage. About 4 a.m. the anchor was weighed and the steamer followed a direct course to the island. The sea was fairly heavy, but we made good progress, sighted the island at 10.30 a.m. and anchored at 11.30, about a mile from the shore, which is as near as large vessels can safely come owing to dangerous sand bars which extend in several directions from the land.

ARRIVAL AT THE ISLAND.

As soon as the steamer was sighted signals were run up from the look-out point on shore, and one of the large surfboats was soon got out and manned and on its way to the ship. The Superintendent of the island, Mr. R. J. Boutellier, came in this boat and extended a cordial welcome to us to the island. A load of supplies with the baggage of the party was first landed, and the next trip we were all taken ashore. On the way to land we were several times surrounded by shoals of large cod-fish which were sporting about and jumping out of the water in a very vigorous way. We also met a number of seals near the shore, which poking their heads above water eyed us with great curiosity, while hundreds of terns were flying just overhead making very discordant screams. As there is no harbour, wharf or sheltered landing place on any part of the island the only way of reaching the shore is to ride in on the crest of the breakers. In this way the visitors reached within a few yards of the island when they were carried to dry land on the shoulders of some of the sturdy officials who trod the water as if it might have been their native element. As the sea was comparatively calm there was but little difficulty experienced in getting ashore.

INTERESTING SCENES.

On landing the scene was one of great novelty and interest. The island is a singular formation, the larger part consisting of bluffs and rolling hills of white sand varying in height from 20 to 100 feet, much of which is partly held together by the roots of a sand-binding grass *Ammophila arenaria*, while considerable areas are covered with loose sand which is blown about by the strong winds which prevail there, hence the configuration of the surface is ever changing. Near our landing place was the boat-house which has been built in a large gully which has been formed by the tearing away of a high sand cliff by the wind. Near the west side of the gully stood a pyramid of sand which had originally been a part of a continuous cliff running from east to west. The gully had apparently been worked out in two parts, and when the excavation was complete this pyramid was left standing between the two, a perfect cone from 30 to 40 feet in height. Passing up through this gully we got our first view of the interior of the island. From the hill tops on the north side the land sloped away

southward in a very irregular undulating manner until it almost reached the level of the ocean. Before us lay the Superintendent's house, painted white, with an acre or two of timothy and clover in front of it which was as green as a pasture field on the main land. Beyond the house lay the large inland lake of salt water which occupies so large a part of the interior of the island. Beyond that was the south bar built up of varying heights by the shifting sand, and outside this the ever rolling breakers of the turbulent ocean.

UNPACKING AND HEELING IN THE TREES.

We were soon comfortably lodged with the Superintendent's hospitable family, where we were to spend a busy week, and the remainder of the afternoon and evening was spent in looking over the ground to find a suitable location where we could unpack and heel in our precious cargo of trees. In the meantime the Superintendent had manned another surfboat, and by dint of much hard rowing our 18 large cases of trees, together with the stores brought for the island were all landed on the beach before night fall. The side of the sand gorge on the way up from the boat-house was chosen as a suitable and convenient place for the heeling in of the trees, and early next morning two sturdy yoke of oxen were engaged in hauling the ponderous boxes from the sea shore to this spot. By 7 a.m. all available hands were at work at the trees, some opening and unpacking the cases, others digging trenches in the moist sand in which the young trees were placed and the roots well covered. By the time evening came 16 of the 18 boxes were unpacked, and the remaining two were finished on Saturday morning. The young trees came out in very good condition. They had been six weeks packed, a little mould was occasionally found on some of the roots and stems and a few of the evergreens were partly decayed, but the injured specimens formed a very small proportion of the shipment. The trees had been skilfully packed so as to admit air to all parts of the interior, and the great bulk of the material was quite green and fresh looking. The early part of Friday was fine and bright, but cool, later in the day there was a little rain and towards evening it was quite windy.

STARTING THE FIRST PLANTATION.

On Saturday the 18th, after finishing the unpacking of the two remaining cases of trees and the boxes of fruit bushes, &c., which were brought from Ottawa, the first plantation of trees on the island was started on the upper part of a sandy bluff near the north shore, and north-east of the look-out station. This was fairly well covered with the sand binding grass *Ammophila arenaria*, and was partly protected by a ridge all around, leaving the part chosen for planting in the form of a shallow basin. In this plantation the trees were put from 2½ to 3 feet apart each way among the grass without any preparation of the land. The planting was begun just under the ridge on the south side, and was done as follows:—A spade was pressed down to its full depth in the sand, and pressed backwards and forwards several times until an opening had been made, when the spade was withdrawn and the young tree inserted so as to have its roots well underground when the sand was pressed against the tree firmly with the foot. In planting two men worked together, one used the spade and the other inserted the trees and pressed the sand firmly about the roots with his foot. Before the day closed a large number had been thus planted. The soil at this point seemed to consist wholly of pure sand, no humus could be detected in it.

CHURCH SERVICE ON SUNDAY.

On Sunday morning a church service was conducted by the Superintendent of the island, Mr. Boutellier, who read the service of the Anglican Church and a short sermon

afterwards. There were 14 or 15 present, and all joined heartily in the singing. The musical part of the service was greatly aided by the piano played by Mrs. Boutellier, and a violin played by her son. The service was interesting and impressive. The congregation were summoned by a bell mounted outside the building which had been got from a wrecked vessel. A good deal of the furniture in the dwellings on the island consists of articles rescued from similar disasters; indeed one finds reminders on all hands of wrecks.

LOOKING OVER THE GROUND.

In the afternoon a walk of several miles was taken along the shores of the lagoon, and some promising sites for other tree plantations examined. During this ramble a considerable area of ground was found which was covered with 3 or 4 inches of black peaty soil mixed with sand and with pure sand underneath. On this land the common juniper was growing, also masses of crowberry, *Empetrum nigrum* and quantities of wax myrtle (*Myrica cerifera*), blueberry (*Vaccinium*), wild rose and other plants. Doubtless this dark peaty layer has been formed from the gradual decay of many successive crops of these plants and shrubs. The weather was more or less foggy during the greater part of the day, clearing up at intervals, with a strong wind from the north which worked up a very stormy sea and the breakers were so powerful that it would not have been practicable to have gone out to a ship in such weather.

ADDITIONAL PLANTATIONS BEGUN.

On Monday morning, May 20, we were all early at work at the trees with the available force so divided that planting was carried on during the day at three different points. The weather was foggy, windy and cold, but plenty of exercise induced warmth. A plantation of trees was put out in front of the Superintendent's house, another on the east side, and a third was put in the Superintendent's garden. In the latter enclosure, which was a good sized piece of ground, all the small fruits were planted, all the smaller lots of shrubs and trees and 10 or 12 each of all the other varieties. Hence in that plantation specimens of all the different sorts under trial are ranged side by side under similar conditions. The garden plot, originally sandy, had with the frequent application of manure from the barn and stables become somewhat loamy, so much so as to grow vegetables fairly well. In such soil many of the trees and shrubs are likely to do well. The plantation in front of the Superintendent's house is nearly pure sand, that on the side has a little loamy material in it, and another at the back of the house is of the same quality. As the result of this day's work several thousand trees were placed.

EVENING SEARCH FOR TERN'S EGGS.

Towards evening three of us went across Lake Wallace in a boat to the south side for tern's eggs, as we found them very good eating. On landing we found the eggs quite plentiful. There were thousands of the birds flying around screaming and swooping down towards us in a most threatening manner. Their nest is simply a little hollow place worked out in the sand with sometimes a few bits of sea-weed in it, usually eel grass, but this is exceptional. In these nests which were scattered all over the surface, and more numerous on elevated knolls, we found from one to three eggs. In a short time our party gathered over twelve dozen. In most nests there was only one egg, in from ten to twenty instances two eggs, and in one nest only, three eggs. There would doubtless have been more eggs in some of the nests, as three is the usual number these birds lay, but for the fact that they had been gathered on that part of the shore two days before when we had a large supply for breakfast.

HOW COOKED AND SERVED.

In cooking these eggs they are usually fried. A large number are broken and put into an open dish where the little round bright coloured yolks looked quite pretty in their transparent surroundings. When a sufficient number are ready they are turned into a frying pan and cooked—without breaking the yolks—until the mass is quite firm. It is then turned out on a plate, cut in pieces and served. A slice cut through the mass looks quite attractive, and with the hunger which comes with plenty of exercise in a very invigorating atmosphere they seemed delicious. There was no lack of appetite however with any of our party, and we were always ready for our meals.

A JOURNEY THROUGH THE ISLAND.

As our steamer was to come for us on Thursday it was decided to devote Tuesday to an excursion down the island, 15 miles to the East Light. We had breakfast at 6.30 a.m., and started at 7 o'clock sharp. Three of the party rode on ponies and the others in vehicles. The morning was foggy, but the fog soon lifted, and we had a lovely bright day. On our way we found a very suitable spot for a large tree plantation, about 1½ miles east of the main station, a large undulating depression with protecting ridges all around, and covered with peaty soil three or four inches deep. There a large quantity of trees were subsequently planted, and the grove is now known as Gourdeau Park. This drive was a most interesting one and revealed to us all the main characteristics of scenery on the island. It was evident at many points that during the strong gales the wind played havoc with the loose sand, often materially changing the contour of the surface in a single season. Drifts had occurred in some places so deep as to bury the telephone poles, in others their bases would be blown bare. On our way we passed a building which had just been fitted up for a school. This is a new thing for the island.

POPULATION OF THE ISLAND.

The entire population distributed about and between the two lighthouses, which are about 18 miles apart, number 45. There are 18 men, six of whom are married, and their wives and children make up the remaining number. The number of children needing school privileges is from 10 to 12, and hitherto they have had no means of education, excepting what they could get in their homes. An arrangement has now been made for a teacher and the children who do not live within walking distance will come to the school on Monday morning and return home on Friday evening, boarding in the school house and occupying dormitories there at night. This school will be a great boon to the people.

ORGANIZATION OF THE LIFE-SAVING SERVICE.

The men on the island are divided into small groups so arranged at different points as to admit of the inspection of every part of the shore of the island twice each day. All the stations are connected by telephone with the Superintendent's residence, and reports are made to him morning and evening by each station. At the main station there are five men who take the inspection of the coast alternately for 10 miles—five miles on either side. The west end lighthouse men take charge of about six miles. The men at No. 3 station, which is nine miles east of the main station, inspect 10 miles of coast line. Those at No. 4, which is 14 miles distant, inspect 12 miles in the morning and 24 miles in the evening, and the men at the east end lighthouse have the inspection of 12 miles of coast line in the morning and none in the evening.

In this way provision is made for a careful inspection of every part of the shores of the island twice each day. When the day is clear, inspection can be made with glasses from certain look-out points, but in foggy weather, which is very common, the whole distance must be travelled over and the result telephoned to the Superintendent. Island ponies are used in travelling. In case a vessel is seen flying signals of distress this is reported at once to the Superintendent, who gives prompt instructions as to what is to be done and proceeds with all speed to the scene of action. There are three life-saving stations, the central one, No. 3, and No. 4, where life boats and other life-saving appliances are kept, and a life-saving crew can be assembled at either of these stations in about half an hour.

RECENT HARDSHIPS OF FISHERMEN.

The fishing for cod on the banks is usually done in small boats with two men in each, and each fishing schooner is supplied with several of these boats. In foggy weather the men sometimes lose sight of their ships and drifting to sea are lost. A few days before we arrived two boats had drifted to the island, each containing two French fishermen; one boat had been out for five days, the other for two days, and during this time the men after the first day had nothing to eat but raw fish. The men who were five days out reached the shore of Sable Island in a very exhausted condition, scarcely able to crawl. Another boat also with two men had for a time been in company with one of the two boats saved, but after the first day they parted. Nine days later this boat drifted to the island shore bottom upwards. There are generally more or less cases of this sort every year.

Substantial wooden buildings have been erected by the Government at different points to serve as shelters for shipwrecked people which are fitted up with beds and sleeping berths and provided with bedding. Sufficient stores of food are also kept on the island to feed for some time a considerable number of people so that there may be enough for the crew and passengers of any ship which may be so unfortunate as to be wrecked here.

The remains of many wrecks were seen during this drive, the most prominent of which was the *Crofton Hall,* a good sized iron vessel, which was wrecked some three or four years ago and still remains unbroken, embedded in the sand on the bar at the eastern extremity of the island. We visited station No. 4, where some additional sites for tree planting were selected, we examined the life-saving appliances there and visited also the eastern lighthouse.

On the return journey we drove along the north beach for some miles, here seals were very abundant in large bands, of about 50 to 200, lying on the shore enjoying the warmth of the sun. As we approached the members of the flock would raise their heads in alarm and wobbling along in their own jerky way with a sort of undulating movement they soon reached the water. Their style of moving on land was very ludicrous. Sometimes the young seals which cannot travel fast are left behind and may then be easily caught. After a very pleasant and most interesting drive we reached the main station a little before sundown.

REACHING THE END OF OUR VISIT.

Wednesday was our last working day, the weather was bright and tree planting was pushed along rapidly, and by the close of this day we had succeeded in planting in all about 10,000 trees, leaving 71,000 still for the Superintendent and his men to plant before the work would be completed.

On Thursday morning there was a dense fog, the work done was reviewed and full instructions left with the Superintendent in reference to the completion of the planting. About 10.30 the fog lifted when our steamer was seen about a mile from the

shore awaiting our arrival. We had, on the whole, favourable weather. The temperature had varied during the week spent on the island from 38 to 57—the latter being our hottest day. We bade our hospitable friends farewell with much regret as our stay had been most enjoyable. The surf boat was got out, but the sea was heavy, and it was no easy matter forcing it through the breakers. Many attempts were made and the boat thrown back repeatedly on its side before the resistance of the water could be overcome. Eventually it was pushed through and started on its first trip with the baggage and part of the passengers. In the course of 30 or 40 minutes the boat returned.

THE DEPARTURE.

After much struggling with the breakers the boat was finally got into position again, and on the word of command being given the passengers and boatmen jumped quickly in and with a united effort on the part of the crew and their assistants on shore the boat was started. With a hearty pull she mounted the first breaking line of surf and was fairly afloat. At first she dipped high and low as we passed through the several lines of breakers, but in a few moments more she was fairly clear of these, and we were then rocked in the swell of the ocean. The getting off was exciting and we were tossed about considerably before we reached the side of the steamer where the passengers climbed up in turn the companion gangway and were soon safe on board.

We now bade our host, the excellent and capable Superintendent of the Island, farewell, giving our parting injunctions concerning the trees, the surf boat went off and we started for Halifax. The sea was very rough, and the steamer pitched and rolled continuously during the afternoon and through the night, but we landed safely at Halifax on Friday morning at 6.30.

SAMPLES OF SOIL FOR ANALYSIS.

I brought with me a sample of the almost pure sand forming the soil on the top of the sandy bluff on which the first plantation was made in which the sand binding grass was growing, also two samples of the black peaty layer which covers the sand to a depth of 3 to 4 inches over a large portion of the central part of the island, probably to the extent of 1,800 to 2,000 acres. One of these was taken from the large area chosen for the plantation to be known as Gourdeau Park, and the other was from similar soil some miles further east. I also brought a sample of similar material picked up on the beach on the south shore where it was being washed by the sea. A fifth sample consisted of a bunch of the sand-binding grass *Ammophila arenaria*. These were submitted to the Chemist of the Experimental Farms, Mr. F. T. Shutt, for analysis, who reports on them as follows:—

'ANALYSIS AND REPORT ON SAMPLES FROM SABLE ISLAND.

By Frank T. Shutt, Chemist, Dominion Experimental Farms.

'No. 1. Sample of the sand from field on top of the bluff, north-east of the look-out, where first forest clump was planted. It contains roots of grass *Ammophila arenaria*. Weight of sand, 2 pounds 13 ounces, containing ¾ ounces of grass roots.
'Analysis of this sand after separation of the greater part of the fibre showed ·0018 per cent of nitrogen.

Digestion of this sand with hydrochloric acid (sp. gr. 1·115) at the temperature of boiling water for 5 hours, showed that ·412 per cent had passed into solution.

The examination of this acid solution gave the following data :—

Oxide of iron and alumina	·328
Lime	·062
Phosphoric acid	·012

Potash :—By the spectroscope, traces of potash were plainly discernable. With the usual reagent (platinic chloride) only a very faint precipitation was obtained when working on an acid solution from 10 grams of the sand.

'No. 2. Sample of peaty soil from surface underlaid by sand in central part of island 1½ miles east of residence of Superintendent where a large block of trees has been planted, locality known as Gourdeau Park, layer 3 to 4 inches thick.

'Analysis of (air-dried) peaty soil:—

	p. c.
'Moisture	4·87
'Organic matter	22·22
'Mineral matter practically sand	72·91
	100
'Nitrogen in organic matter	·878

'No. 3. Representative sample of peaty soil covering a large area some distance east of where No. 2 was taken, from 3 to 4 inches deep, and underlaid by sand. Weight soil, air-dried, 3 pounds 12½ ounces, containing 5½ ounces fibre.

'Analysis of (air-dried) peaty soil:—

	p. c.
'Moisture	1·48
'Organic matter	8·63
'Mineral matter practically sand	89·89
	100
'Nitrogen in organic matter	·271

'No. 4. Sample from a large lump of peaty soil found on the beach on the south shore, being washed by the sea. It contains a considerable amount of semi-decayed eel grass *Zostera maritima*. Weight of soil, air-dried, 1 pound 5 ounces, containing 2½ ounces fibre, principally eel grass.

'Analysis of (air-dried) peaty soil:—

	p. c.
'Moisture	3·00
'Organic matter	9·50
'Mineral matter practically sand	87·50
	100
'Nitrogen in organic matter	·267

'The above three samples are similar in character, and no doubt also as to origin. They may be considered as semi-decayed vegetable matter (largely fibrous) and sand, and practically the only point of difference between them lies in the varying proportions of these two constituents. In the air-dried condition the sand can be very easily separated from the organic matter by shaking and sifting, showing that there is no intimate incorporation of these constituents as in the case of true soils.

'The plant food they contain other than nitrogen is present in very small amounts, and we must suppose exists in such a condition that it is only slowly set free for plant use.

'No. 5. Analysis of the (air-dried) grass or hay *Ammophila arenaria* from Sable Island, chiefly barren stems :—

	p. c.
Moisture	12·42
Protein	13·81
Fat	·81
Fibre	41·00
Carbo-hydrates	26·71
Ash	5·25
	100

'In protein or albuminoids this grass makes a very good showing, being quite equal in respect to these important nutrients to many of our highly esteemed cultivated grasses.

'The percentage of fibre is above the average, and this together with the somewhat high protein, necessarily makes the carbo-hydrates (starch, sugar, &c.) much lower than usual. This hay contains 5·25 per cent ash or mineral matter, which on further examination is found to include 1·37 per cent of sand. This sand had remained attached to the grass in spite all care being taken to separate it.

'The indications are that though probably somewhat less digestible than the best hays made from grass cut before seeding, this Sable Island grass has a distinct and even moderately high feeding value due to its comparatively speaking large protein content.'

The results obtained by Mr. Shutt are very interesting and valuable. The ponies, of which there are four bands numbering about 120 in all running wild on the island, feed almost entirely on this grass which looks tough and hard and does not impress one as likely to be very nutritious. The ponies, however, do well on it, and even the domestic cattle use it considerably, although they are said to prefer timothy and clover. The fact that this grass has a decided nutritive character is now demonstrated.

ARRANGEMENTS FOR THE USE OF ARTIFICIAL FERTILIZERS.

Realizing at the outset that it was probable that the soil of some of the sites which might be chosen for tree planting on the island would be deficient in the elements of fertility needed for the healthy growth of trees, a sufficient quantity of artificial fertilizers was taken to Sable Island with the trees. These included nitrate of soda, muriate of potash, superphosphate of lime with a few barrels of quick lime. Instructions were left with the Superintendent as to the use of these after the trees were planted, and the proportions in which they should be mixed. That after mixing they should be diluted with an equal bulk of sand and scattered in small proportion over the ground once a month for three months, leaving a small portion of each plantation untreated for comparison. This would probably give the trees at the start sufficient plant food for healthy growth.

A NATURAL SOURCE OF PLANT FOOD.

There is one source of plant food on Sable Island which should not be overlooked. Sea birds are most abundant there. After travelling over the greater part of the island and seeing the immense number of terns everywhere, from a rough computation of the number per acre and the acreage of the island we estimated that these birds alone did not fall far short of a million on the island. They feed on small fish, and they are so incessantly active that they consume large quantities and their droppings are seen on every hand. This perennial source of fertility must have its effect. Like the guano

on the sea-girt islands in parts of South America this material is very rich in plant food, which is in readily soluble forms and the quantity deposited every year would probably be sufficient to supply a considerable part of the small proportion of these elements needed for healthy tree growth. Traces only of these useful elements are found in the clear, pure sand which covers so large a part of the surface of the island, probably for the reason that this fertilizing material if not promptly taken up by plant roots is so soluble that it is soon washed through the porous sand by frequent rains and its accumulation is thus prevented.

CONDITIONS OF CLIMATE—STRONG WINDS.

The climate is a very singular one, and one of the chief difficulties in the way of rapid success in tree planting is the force and constancy of the winds, and the frequency of the gales. From the meteorological tables here given, prepared by Mr. W. T. Ellis from material kindly furnished by Mr. R. F. Stupart, Director of the Meteorological Service of Canada, covering nearly four years, it appears that the average hourly velocity of the wind during the whole of that period has been more than 18 miles, while the gales have averaged over 10 each month when the winds have ranged mostly from 40 to 65 miles an hour. A study of the temperatures will show that there are no extremes of heat or cold on the island; that the highest temperature during the past four years has been 78, and the lowest point reached by the thermometer during the same period was 5 above zero.

Months.	Maximum.	Minimum.	Total Precipitation.	Average hourly velocity of wind.	Maximum velocity.	Number of gales.	Fair.	Fog.
1898.	°	°	Inches.	Miles.		Days.	Days.	Days.
January	48·5	6·0	5·65	21·5	48	18	15	2
February	43·0	17·0	1·54	18·7	64	14	20	2
March	46·5	23·5	3·20	17·8	46	17	20	9
April	53·0	27·0	4·90	19·8	38	18	16	10
May	60·5	33·0	2·90	15·7	41	7	24	8
June	66·0	39·0	3·12	15·9	39	9	20	14
July	75·0	45·5	4·55	11·8	25	1	17	10
August	77·0	58·0	4·44	12 0	27	2	18	17
September	73·5	46·0	5.89	16·6	42	9	19	7
October	61·5	39·5	3·85	18·6	36	13	20	6
November	63·0	30·0	8·68	19·6	49	18	16	9
December	52·0	18·0	6·64	23·7	59	20	16	6
Averages	59·95	31·87	4·61	17·6	42·8	12	18	8
1899.								
January	48 5	7 5	2·17	24·4	53	21	19	3
February	39·0	9·0	2·78	26·0	65	19	17	6
March	47·5	17·0	4·96	22·6	46	20	22	13
April	48·0	29·0	1·65	19·5	56	13	22	12
May	59·0	28·0	2·62	18·2	39	10	21	7
June	64·5	41·0	4·97	12·8	27	3	16	11
July	71·0	52·0	2·30	14·9	31	5	22	·21
August	74·5	56·0	3·76	12·6	32	2	20	2
September	72·0	48·0	3 52	16·0	40	7	20	8
October	69·0	44·0	5·71	16·8	46	9	22	6
November	59·5	32·0	2·66	20·0	56	12	18	8
December	53·0	24·0	4·31	18·8	49	18	17	6
Averages	58·79	32·29	3·45	18·5	45	12	19	8

Months.	Maximum.	Minimum.	Total Precipitation.	Average hourly velocity of wind.	Maximum velocity.	Number of gales.	Fair.	Fog.
1900.	°	°	Inches.	Miles.		Days.	Days.	Days.
January	52·5	17·0	5·76	23·7	56	20	14	5
February	52·0	7·0	3·59	26·5	56	20	17	3
March	48·5	15·5	6·15	22·2	52	19	16	8
April	52·5	32·5	5·55	19·4	46	16	14	6
May	57·8	34·0	3·04	16·2	37	6	19	7
June	69·0	40·0	2·84	14·2	27	6	21	14
July	75·0	49·0	2·25	13·4	32	3	23	18
August	73·0	51·0	6·16	13·6	40	4	17	6
September	70·0	47·0	5·66	16·2	49	7	17	8
October	66·0	37·0	2·31	17·4	51	11	21	5
November	60·5	27·0	2·94	22·7	46	24	11	8
December	49·0	20·0	2·94	21·8	52	15	14	3
Averages	60·48	31·41	4·09	18·9	45	12	17	7
1901.								
January	47·0	5·0	3·24	22·7	58	14	19	9
February	45·5	19·0	3·21	21·9	45	9	12	4
March	47·0	19·0	4·04	20·2	56	12	23	11
April	54·0	34·0	2·36	19·4	60	4	24	17
May	57·0	34.0	4·97	13·3	34	1	18	10
June	63·0	44·0	2·38	14·8	36	1	24	15
July	77·0	53·0	2·90	12·9	36	0	28	19
August	78·0	60·0	3·36	11·3	34	1	26	13
September	76·5	48·0	1·65	17·4	42	5	26	7
October	68·0	41·0	4·52	18·4	48	4	25	9
November	57·5	30·0	2·10	18·2	62	7	23	0
December								
Averages	60·95	35·18	3·17	17·3	46	5	22	10

PROGRESS OF THE WORK.

Letters have been received from the Superintendent every time an opportunity has occurred of sending one. As a rule the only communication the island has with the outside world is when a supply boat visits them, which is seldom more than three or four times a year. We left the island on the 23rd of May, and the first letter received bears date of 17th June, written in anticipation of the visit of the steamer as it did not reach me until July 12. Mr. Boutellier says: 'I feel that I can write to you now and give you all the particulars as to the planting, as we put in the last of the trees to-day at 4.30 p.m. There are about 200 to 300 planted at east end light, about 3,000 at No. 4 station, 1,000 at No. 2, and about 5,000 at No. 3 station, the balance were planted in what I have named Gourdeau Park. I managed to plough about nineteen-twentieths of the ground in this park, and there was about three inches of the black mould all over, and I was surprised at the even thickness of it as it varied very little in that respect. The pine and maple seed I also put in there to-day in ploughed ground, and then run a harrow over it lightly. I expect to have this ground all fenced before the end of the week with the wire and posts you brought over.

'I may say that almost everything planted seems to have taken root, those you first put in are budding freely, although I regret to say that on Friday last we had a moderate gale which lasted about 24 hours when the wind at times exceeded 40 miles an hour. I find that on the trees with soft leaves which had just opened, they were burned off as if from frost. The pines and spruces were not affected as far as could

le observed. For a week after I began the park plantation it was wet and foggy every day, and on the 2nd of June we had a wreck. The *Stella Maris*, of Granville, France, on the N.E. bar, our life boat went out but before we could reach the vessel the crew had abandoned the wreck and taken their own boats in which they came ashore. This was a temporary set back to the planting, but I employed three of the crew to help us, or I should not have finished the planting so soon. I am glad to have got them all in before the dry weather of July. I think it has been a favourable time, as we have had frequent and some heavy rains. Tree growing grows on one, and I hope that in the near future Gourdeau Park will be one of our show places. You can understand what interest I took in it when I ploughed over ten pounds of superfluous flesh off, and had a crick in the back several nights.'

SECOND REPORT.

The next letter was written on July 29, 1901, but in the interval Col. W. P. Anderson, Chief Engineer and General Supt. of Lighthouses, paid a visit to the island and took notes on the condition of the trees, and on his return to Ottawa kindly gave me an account of what he had seen and reported very favourably as to the general condition of the plantations. In Mr. Boutellier's letters, he says: 'Nearly a month has elapsed since Col. Anderson's visit, and yesterday I visited the plantations. I cannot give you close detail as to the many varieties, but can give you a general idea of the whole lot, and those that call for special mention. All the pines are growing, excepting a few. The white pine *P. strobus* can't stand the wind, but when sheltered grows freely. While the birches have leaved, they are feeble. Common juniper is a failure; Virginian juniper good. Maples, willows are growing and seem to do as well in the large plantations as in the nursery in the garden inclosure. Arbor vitae good. To generalize, I think the plantation at Gourdeau Park looks as well as the most practical enthusiast could expect. The small plantations at the other stations are doing about the same.

'The 50 lbs. of seed of maritime pine planted is up as thick as it can stand, and looks very fine and strong; they are standing the last few weeks well, which have been warm and dry. A few of the Manitoba maples are also up about two inches above the ground.

'In the garden plot there are some disappointments among the small lots. All the specimens of the following have died: *Betula alba laciniata,* four lots of honeysuckle, *Spiraea, Anthony Waterer ; Lilac Michael Buchner ; Retinospora filifera, Cornus sibirica variegata, Halesia tetraptera, Juniperus communis* and Cuthbert raspberry ; of some others a portion have died, but samples of each are left.

'The following are doing well and making good growth: Beach plum, *Pyrus prunifolia,* many of the currants and gooseberries, Golden Queen raspberry, blackberries, strawberries, roses, Siberian crab, *Acer platanoides, Ampelopsis quinquefolia, Berberis purpurea, Deutzia crenata, Bignonia grandiflora, Retinospora plumosa,* Hovey's arbor-vitæ, Columbian arbor-vitæ, also *Elwangeriana* and *Globosa, Amur privet, Euonymus Japonica* and *Lycium Europeum.* Of this I feel quite satisfied that if only one variety grows and succeeds nearly all the others may be grown under the shade or protection of that one. Shelter seems to be the desideratum. One dressing of the mixed fertilizers has been given, but it is too soon to expect results.'

THIRD LETTER.

The last communication was written on November 5. The Superintendent says : 'With regard to the condition of the trees the latter part of the summer was very dry, so much so that our vegetables are less than a half crop, so that you can see it must have been trying for the trees.

Rainfall—

June, 2·38 inches; spread well over the whole month; fogs as well.
July, 2·90 inches; spread well over the whole month; fair; warmer.
August 1 to 13, 3·36 inches; no fogs; very warm.
September 8 to 30, 1·65 inches; no fogs; very warm; dry gales.
October 3 to 24, 3·60 inches; no fogs; warm; some high winds.

'You will see from this that the trying time was from August 13 to October 3, with only 1·65 of rain, no fogs and very warm weather for Sable Island. The thermometer averaged high all summer.

'This drought killed most of the weaklings, and the high winds burned the leaves off the deciduous trees between September 21 and 26, during which time it blew a continuous gale from S.W. around to north. After the gale subsided, the leaves were as though a fire had run close to the trees and scorched them. It was not cold, and we have had no frost yet.

'Many of these trees were very promising, and some of them are budding again since we have had rains. We have had a fair amount of blooms from the roses which were much appreciated. We also had a sample of the strawberries. Many of the varieties made good growth, but we shall be able to judge better as to their permanent hardiness here next July.'

'Now, as I think I have shown you the worst side, I will show the other. All the evergreens looked dull during the drought, but after we had a few rains they improved wonderfully. All the pines, except the white pine *P. strobus* are looking splendidly and have made growth. The plants from the pine seed also grew well, but lately I noticed that many were turning a bluish cast. Some spruces survive, but few look promising. Arbor-vitæ suffered much from drought, but there are many promising specimens in various localities.'

'This general statement of the conditions of the trees applies to all planted in the various localities, but I think Gourdeau Park, 1½ miles east of main station, is most promising, and next is 4th station plot. In all plots planted the weeds and grass has grown freely, and I am satisfied now that this is best for the trees; it gives shelter. If the ground had been kept clear the drifting sand would abrade the bark, and it is very noticeable that trees do best where sheltered by grass or wild plants. In 'Gourdeau Park' there is shelter owing to the conformation of the ground, and the slopes have different exposures. I find where the slopes are exposed to the south-west and west winds (our prevailing winds) the trees are least promising.'

The experience thus far had covers too brief a period to permit of the forming of any decided opinion as to the ultimate success of this experiment in tree planting on Sable Island. It does, however, seem to me notwithstanding the unfavourable conditions that the outlook is promising. The work is most interesting and the outcome of it will be carefully watched and the results obtained recorded from time to time in our reports.

AGRICULTURAL AND HORTICULTURAL DISPLAYS AT THE GLASGOW EXHIBITION.

The immense resources of Canada as a food producing country and the important position which agriculture occupies here are not yet very well known in Great Britain, and one of the objects in view in the exhibit made in Glasgow was to bring before the visitors some practical evidences of these remarkable agricultural resources and of the great progress made in recent years towards their development. With the very large variety and abundance of material available at the Experimental Farms, the assistance of the Departments of Agriculture of the provinces and the kind co-operation of lead-

ing farmers in different parts of the Dominion there was brought together in the Canadian pavilion at Glasgow one of the finest collections of cereals ever made.

By instruction of the Hon. Minister of Agriculture, Mr. W. H. Hay, accountant of the Experimental Farms, was sent to Glasgow to put this material in place. His long experience with exhibitions in this country and the ability and artistic taste he has shown from time to time in the arrangement of the products of the Experimental Farms at exhibitions at home led to his being chosen to do similar work at the Paris Exposition in 1900. There he arranged an exhibit which was very much admired, but his work in Glasgow seems to have been an unusual triumph.

THE CANADIAN AGRICULTURAL TROPHY.

Mr. Hay in his report, says: 'The agricultural products were shown in the form of an immense trophy, situated in the centre of the building, which was erected in the form of an octagon with a circumference of 65 feet, and rose to a height of 35 feet. In front of four of the arches were placed open stands or shelving, and on these were displayed the threshed grain in bottles of many sizes and shapes. Each sample was carefully labelled with the name of the variety, and as far as practicable the place of origin and the yield per acre was given. The placing of the bottles in the arches permitted of their being seen to advantage and examined from all sides. The other four arches were left open and used as passage ways. The spaces between the arches were built up with pillars of grain forming an open square with a glass cylinder of grain in the centre.

'On the outside the lower part of the trophy was decorated with sheaves of grain and hundreds of bunches of grain and grasses. Higher up the grain was massed and arranged in gothic arches and in circles, and when completed the structure had the appearance of an immense temple of cereals. Coats of arms of the provinces were placed over each of the main arches, and some fine specimens of mounted "prairie chickens" were distributed among the sheaves of grain.

'In the centre of the trophy was a circular settee for the convenience of visitors who desired to rest, and above this was a glass case in which was shown samples of wool, flax, hops and leaf tobacco. From the ceiling of the trophy was suspended bunches of Indian corn in the ear, leaf tobacco and flax. Several large open urns with a capacity of about two bushels each were placed on convenient stands, and filled with choice red fife wheat. The desire for samples was so great that by the close of the first day the urns were nearly emptied of their contents. They were refilled, but in a day or two were almost empty again. As the supply available was not sufficient to continue this free distribution very long the urns were shortly filled with palms, shrubs and plants. A further supply of such decorative material was used with good effect at different points on the trophy. A large number of electric lights were arranged in the arches and circles so as to illuminate the whole trophy, and it was thus made to appear very attractive at night.

'A number of excellent photographs were displayed in convenient places about the trophy which interested the visitors very much. These included views of the Experimental Farms, fruit farms, scenes in connection with ranching, also with harvesting in Manitoba and the North-west Territories. Good views were also shown of settlers' homes, giving the appearance of the farm when first located, and again a few years later under improved conditions.

GOOD RESULTS FROM THE EFFORT.

'The results of the installation of the agricultural exhibits at Glasgow were very satisfactory. No other display of the sort could be compared with it, and the material was all in place before the opening day. The agricultural trophy elicited the admira-

tion of visitors on every hand for its colossal character, and for the great variety and high quality of the products of which it was constructed. Much of the material for this magnificent display was provided from the crops of the experimental farms, the branch farms at Brandon and Indian Head being the largest contributors. The straw of the samples of grain sent from the North-west was wonderfully clean and bright, and commanded the admiration of many of the old country farmers.'

THE CANADIAN FRUIT DISPLAY.

The display of fruit was also large and varied and highly creditable. This was in charge of Mr. Robert Hamilton, of Grenville, Que. Lists of the varieties of fruits deemed most desirable for showing in Glasgow were prepared by the writer when at the Paris Exposition in conference with Mr. A. McD. Allan and Mr. R. Hamilton. These lists were forwarded to Ottawa and the fruit was secured in good season. As soon as collected it was sent at once to cold storage in Montreal and from Montreal to cold storage in Glasgow early in the spring. On arrival in Glasgow the fruit was placed in cold storage there and taken out from time to time as required. When the packages were opened, the fruits, which were chiefly apples with a few pears, were found to be in excellent condition. The total supply sent was about 400 bushel boxes and five barrels. The number of varieties of apples shown at the opening of the exhibition was over 60, and included all the leading commercial sorts grown in nearly all the apple producing districts of the Dominion. The display of Canadian fruit was well maintained to the close of the exhibition, and at that time there were over 30 varieties in a good state of preservation. In connection with the exhibit of fresh fruit there was also an extensive collection of other sorts of Canadian fruits preserved in antiseptic fluids. These also were attractive in appearance and gave to the exhibit additional charms.

The fruit sent from Canada was practically the only good display of the sort at Glasgow, and was a constant source of wonder to the many thousands of visitors who daily gathered around the exhibition tables. These repeated exhibits of choice fruits at the large European exhibitions are doing much to dispel the mistaken ideas held—even by educated people—regarding the climate of Canada and at the same time have brought the excellent quality of Canadian apples prominently before a large number of European consumers. The notices given by the press were most flattering, and the excellence of Canadian food products was thus brought under the notice of a large number of people in Great Britain who were unable to be present at the exhibition.

SHOW OF CEREALS FROM THE HARVEST OF 1901.

Later in the season another collection of representative samples of Canadian grain was forwarded from the experimental farms at Brandon, Manitoba, and Indian Head, N.W.T., all fresh from the wonderful harvest of 1901. These were kept together and shown in a separate group, and assisted much in maintaining the interest in the Canadian display to the close of the exhibition.

THE PAN-AMERICAN EXPOSITION AT BUFFALO, N.Y.

A very complete and attractive exhibit of cereals and other agricultural products was prepared by the Experimental Farms for the Exposition at Buffalo. A commodious building was erected there by Canada, and this exhibit filled the greater part of the central court. The experimental farms all contributed to this display, but the greater portion of the material was supplied by the Central, Brandon and Indian Head farms. Grain in the straw was a prominent feature in this exhibit, and the large well-matured heads, with long bright straw especially of that from the farms at Brandon and Indian Head was much admired. Large collections of all the best varieties put

up in small bunches labelled and shown under glass formed a very instructive feature in this exhibit. There were also a large number of different sorts of cereals of very fine quality shown in glass jars tastefully arranged on stands. A good display was made of pease, beans, Indian corn, millets and many other agricultural products, including a good collection of the more important grasses of Canada, the latter put up under the supervision of Dr. Jas. Fletcher, Botanist of the Experimental Farms. The walls above the glass cases of grain in straw and grasses were panelled with various designs ingeniously worked out with different varieties of agricultural crops. These had a pleasing effect and were much admired. These designs were made at Ottawa by the farm foreman, Mr. John Fixter, and worked out under his supervision. He also put up a very fine display of honey produced at the apiary at the Central Farm which attracted much attention. I had the opportunity of visiting this exposition twice during the season, and found that the Canadian exhibit attracted a large number of visitors who were unstinted in their praise of the magnificent samples and high quality of the agricultural products shown.

REPORTS ON SOME JOURNEYS MADE.

It has been my pleasure to attend many important gatherings of farmers, fruit-growers and others during the past year, where I have had opportunities of giving addresses and of joining in the discussion of the subjects under consideration. It has been a matter of regret that the many pressing duties connected with my office have prevented me from accepting more of the kind invitations which have been received, and which under other circumstances I should gladly have responded to.

VISIT TO THE EXPERIMENTAL FARM, NAPPAN, N.S.

On my return journey from Sable Island I paid a visit to this farm, arriving May 24, when I carefully went over the different branches of work carried on there, and discussed future plans with the Superintendent with the object of making the work of this farm increasingly useful to the farmers of the maritime provinces. I found the stock in good condition. The recent additions to the barn accommodation will enable the Superintendent to enlarge his work in this direction, and the added conveniences will permit of the work being conducted to greater advantage.

The farm fields were in good order, but the season was backward and unfavourable, and the crops were not all in. Those which had been early sown were well up and looking healthy. An additional area of land had been cleared which will be gradually brought under cultivation. The general appearance of the farm and the condition of the buildings and stock showed evidences of careful management. Some useful additions have been made to the dairy herd by the recent importation of valuable animals from Great Britain. The flock of sheep has also been greatly improved during the year by disposing of the less desirable animals, and the addition of a number of pure bred Leicesters and Shropshires.

In the horticultural branch additions have been made to the varieties of fruit under test, and also to the collection of ornamental trees and shrubs. The group of perennial plants has been enlarged and additional supplies of flowering bulbs provided.

VISIT TO THE EXPERIMENTAL FARM AT BRANDON, MAN.

In journeying west on my annual tour of inspection of the Experimental Farms, I arrived in Brandon on August 16. Harvesting had begun, and during the two or three days previous had made rapid progress, and on many farms a considerable area

Canada's Agricultural Trophy at the Glasgow Exhibition.

was in stook. The weather was very fine and almost everything looked promising. The farm presented a neat and attractive appearance with its long, straight lines of experimental plots, on many of which the crops were now ripening. The cereals all looked well, excepting some of the oats which had suffered somewhat from rust. Indian corn was growing very fast and promised a heavy return, field roots were also progressing satisfactorily. Hay has been a very heavy crop ; the awnless brome grass and western rye grass have both done particularly well. The cattle in the pasture fields were in good condition, so also were the pigs and poultry. The buildings, implements and the grounds generally all bore evidence of good care. The crops have yielded well as will be seen from the annual report of Mr. S. A. Bedford, the superintendent. Some of the neighbouring farms were visited and most of those well worked promised crops about equal to those on the Experimental Farm.

Many of the trees in the Pyrus orchard had bloomed abundantly, but had been so injured by frost in June that there was very little crop. The plums had escaped injury from frost and the trees were well laden with fruit. Among these were a large number of new seedlings, none of which were ripe at that time, but on my return from the Pacific coast on the 12th September when I paid a second visit to Brandon, many of these varieties were ripe and proved of good quality. The small fruit plantations, the trees and shrubs in the arboretum and the hedges had all made satisfactory growth. The Dakota Cotton Wood *Populus deltoidea* which has until recently been a very promising tree on account of its thrifty and rapid growth has for two or three years past been seriously affected by a yellow rust on the leaves which has destroyed the foliage and so weakened the trees that many of them have been killed outright. This is a serious trouble which seems to be spreading fast in Manitoba, and it is doubtful if it is wise to plant this cottonwood to any great extent as a timber tree on account of its liability to this disease. The Russian poplars so far have been free from this trouble. Samples of the diseased leaves were forwarded to Dr. Jas. Fletcher, Botanist of the Experimental Farms, and in his portion of this report particulars will be found of some of the characteristics of this troublesome growth.

The flower beds about the buildings were full of bloom, and were much admired by visitors of which there were a goodly number every day.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

This farm was reached on August 19, when a careful examination was made of the crops, not only on the Experimental Farm, but on other farms in the district. Some of the grain had been cut, but the harvest was two or three days later than in Manitoba, and the yields were much heavier. The heads on some of the oat fields were so packed as to look from a little distance almost like a solid mass of grain. It was then estimated that some of the fields would give 100 bushels per acre. Wheat also has given larger crops than was expected. A perusal of the returns given by Mr. A. Mackay, superintendent, in his annual report appended, show most remarkable and unprecedented yields, and the neighbouring farmers have in many instances grown crops as large as those on the Experimental Farm. The hay crop has been unusually large. Indian corn gave very heavy returns, mangels and turnips also did well. The farm was found in its usual excellent condition, and reflected credit on the manager.

The crop of fruits was also heavy. A considerable number of the Siberian crabs, *Pyrus baccata* bore such abundant crops that the trees had to be propped up to prevent them from breaking. These fruit trees which have proven perfectly hardy wherever tested in the North-west bear fruits of varying size, on some trees they are very small, on others they are of good size, but they all make excellent jelly if properly treated.

The Making of Jelly from the fruit of Pyrus baccata.

Some of the varieties are astringent, and many experiments have been tried in Ottawa to ascertain the best method of treating these fruits to obtain jelly of high quality and free from astringency. These experiments were conducted by Dr. C. E. Saunders, who has prepared the following notes:—'In order to avoid unpleasant astringency in the jelly the following directions should be carefully carried out. Let the fruit be kept for some time after picking until it is thoroughly ripened. Take one quart of fruit, add about three pints of water, boil for about half an hour crushing the fruit when soft. Strain, first through a cullender and then once (or twice if a very clear product is desired) through a cloth. Heat the liquid to boiling ; add sugar and boil until it will set. This should take about ten minutes. The jelly should not be made very stiff. The amount of sugar to be added depends on whether a sweet or an acid jelly is desired. For a quart of fruit the quantity of granulated white sugar may vary from about a pound to two pounds. In the first case about one and one-quarter pints of jelly should be obtained, and in the second case a little more than a quart. The jelly from *Pyrus baccata* so made should be of a brilliant red colour and of high quality.'

A considerable number of these trees have been sent to settlers in different parts of the North-west during the past five years, and in some instances have now reached a bearing age.

A Disease Affecting Manitoba Maple Seed.

While visiting this farm my attention was called to a disease which has affected the crop of Manitoba maple seed this year, and which has practically destroyed it all through the Indian Head district and as far west as Pense. This disease affects, first, the ends of the wings of the seeds which dry up prematurely, and the disease extends from there to the seed itself. As the disease advances dark spots appear which show through on the seeds, and when these are torn open the interior is found to be dark coloured and empty. A sample of this diseased seed was sent to Dr. Jas. Fletcher, and in his report appended fuller reference is made regarding this new pest.

The plum trees at this farm also gave an abundant crop, and some of the varieties ripened well and were of good quality. The season was remarkable for the rapid growth of all sorts of forest and ornamental trees and shrubs. Flowers also did remarkably well.

VISIT TO REGINA AND PENSE.

A day was spent in examining the crops from Regina to Pense. The grain was found to be very heavy, and although the wheat was a little later in ripening than it was at Indian Head it matured well and was safely harvested before frost came. At Pense I visited the farm of Messrs. Spring-Rice, where I found very much to interest me. The crops were very fine and gave evidence of good farming, and the blocks of trees and shrubs were well cared for and making very excellent growth. A large proportion of these have been grown from young plants and seeds received from the experimental farms. Many interesting flowering shrubs and plants were also found here all in a thriving condition.

VISIT TO SOUTHERN ALBERTA.

From Medicine Hat a trip was made to Lethbridge and from there south along the line of the large irrigation canal recently constructed by the Canadian North-west Irrigation Company, known as the Galt Irrigation Canal, which draws water from an inexhaustible supply in lakes fed by the melted snows of the Rocky Mountains from

which flows the St. Mary's river. The length of the main canal is 61 miles, of the Lethbridge branch 32 miles, and of the Stirling branch 22 miles, making the entire length of this canal system, 115 miles. Water is now available for the irrigation of about 200,000 acres of land lying between the intake on the St. Mary's river—about five miles from the Montana boundary—to the town of Lethbridge. This great engineering work is likely to transform this section of country from one of comparative barrenness (for lack of necessary moisture) to one of great fertility.

Through the kindness of Mr. A. T. Galt, and of the manager of the Irrigation Works, Mr. C. A. Magrath, I was given facilities for seeing this remarkable work. Nine years ago I drove across a portion of this country it was then almost uninhabited, a few bands of cattle only, then ranged the plains, and the only settlement of any size was Cardston. This was a Mormon settlement, numbering then about 400. Since that time the population of the district has increased to fully 4,000 people, and the increase has been most striking during the past two years. About Lethbridge the settlement is of the usual character, and consists of a mixture of nationalities, but that lying south-east of what are known as the 'Rolling Hills' and extending to the Montana boundary is almost entirely Mormon.

GROWTH OF THE MORMON SETTLEMENT.

In addition to the thriving town of Cardston, which now has a population of 1,200, there are two other rapidly growing towns, Magrath and Stirling, both of which were started in 1899. Magrath has now about 600 people, and Stirling 550. At each of these new settlements there were about 2,000 acres under crop this year. At each place eight sections of land containing in all 5,120 acres, are inclosed with a common fence and within this all the crops of the community are protected from the inroads of stock. The houses of the settlers are well built, most of them being neat and comfortable with pleasant surroundings. The streets are wide, and each house has about an acre of land which in most instances is well cultivated with garden vegetables, flowers and small fruits. Evidences of industry and frugality were everywhere seen. The vice of drunkenness is scarcely known among the Mormons, a very large proportion of them being total abstainers. Further, a considerable number of them drink neither tea nor coffee, using only milk or water as they believe this practice to be healthier and find it also more economical.

Polygamy which is usually associated with Mormonism in the minds of most people, seems to be practically dead. It is said to be no longer a doctrine of the church, and as far as could be learned there was not the slightest evidence of such practice existing anywhere among the Mormons in Canada. They seem to be a law-abiding and industrious community, and their methods of co-operation are very helpful to the rapid progress of their settlements and the contentment of their people. In each settlement the head of each family is visited once a month by two of the leading men of the community, the wife also being visited at similar intervals by two of the leading women. During these friendly visits inquiries are made as to the health of the family and as to whether its supplies of food are sufficient, and when cases of suffering or want are discovered efforts are at once made to relieve them.

One of the funds available in the community for relief purposes is known as the 'Fast Fund.' Every family is said to have a fast day once a month, and on that day only one meal is eaten. The value of the other two meals is estimated and an equivalent sum given to the fast fund. This practice, it is alleged, does the fasters no harm, and provides a fund to which all contribute from which supplies can be drawn for the relief of the needy. By such methods much is done to bind each family to the community by bonds of sympathy and common interest.

A Proposed Beet Sugar Factory for Southern Alberta.

One of the wealthy men of Utah, Mr. Jesse Knight, who is reputed to have large revenues from mines in that state, takes a very active interest in the Mormon settlements of Alberta. He has recently purchased a large cattle ranch not far from the irrigated districts, of 100,000 acres for one of his sons, stocking it with 5,000 head of cattle, at a total cost of about $450,000. He has also bought another large tract of land on which to found a new town and settlement, adjacent to the irrigation canal, to be named after his other son, Raymond, where Mr. Knight is about to establish a large beet sugar factory. A party of surveyors were working on the open prairie laying out this town site at the time of my visit, contracts had been made for the ploughing of 3,000 acres of land to be completed before the end of the season, and a number of four-horse teams were then busily engaged in this work. Some of the pioneer settlers for this new town had already arrived, and in the meantime were living in tents. The 3,000 acres then being ploughed will be cropped with grain in 1902, and the following year will be in condition for the growing of sugar beets. Each farmer coming into the settlement will have eighty acres of land and will contract in his deed of purchase to grow not less than ten acres of sugar beets each year, and in this way an abundant supply of beets will be assured. Mr. Knight is an ardent prohibitionist, and is having a clause put in each of his deeds of sale providing that in case of the establishment at any time of any saloon or drinking place on any part of this property, such property shall be forfeited and revert to the original owner. It is expected that the beet sugar factory will be completed during the year 1902, and be ready to utilize the crop of 1903.

A DRIVE OVER THE FOOTHILLS OF THE ROCKIES.

Leaving Cardston a drive of fifty miles was taken over the rolling plains, which form the base of the foot-hill country, crossing the Blood Reserve and ending at the town of Pincher, which is situated on the line of railway through the Crow's Nest Pass. Many settlers are coming into this district, and the crops throughout this part of the country have been very encouraging. Notwithstanding its high elevation of from 3,000 to 3,500 feet the climate is such that fall wheat is grown in many localities quite successfully. This now forms an important crop, both at Cardston and Pincher, many of the farmers reaping from 30 to 40 bushels per acre. The variety chiefly grown at Cardston is a beardless red-chaff wheat known as Odessa; that grown at Pincher is a bearded wheat the name of which has been lost. In all these settlements the people are in the midst of a good ranching country where cattle live in the open during the winter and most of the residents own more or less stock.

THE GREAT COAL DISTRICTS.

After going through the Crow's Nest Pass a day was spent at Fernie, the centre of the great coal producing district, visiting the mines. The output of the mines there at that time was about 1,200 tons per day. A large proportion of this coal is made into coke which is used for the smelting of ores in the mining districts. Three hundred coke ovens were in operation at Fernie, and one hundred more were being built. At St. Michael, 25 miles east of Fernie; two hundred coke ovens were also in course of erection, and some fine seams of coal are being opened there. The supplies of coal in this part of the Dominion are so vast as to be practically inexhaustible.

VISIT TO THE EXPERIMENTAL FARM AT AGASSIZ, B.C.

Pursuing my journey westward I reached Agassiz, B.C., early in September. I found the crops of grain at the Experimental Farm very good. Wheat, barley and oats have all yielded well. The hay crop had been unusually heavy, and Indian corn, field roots and potatoes were very promising. Particulars of all these will be found in the report of the superintendent, Mr. Thomas A. Sharpe. The crops on the Experimental Farm may be taken as a fair index as to those on farms generally in the coast climate.

The fruit crop in the Fraser river valley in which the Experimental Farm is located, was disappointing. Cold and wet weather in the spring prevented much of the fruit from setting, so that there was comparatively few apples and pears. Later in the season rot prevailed in the plums to such an extent that a considerable proportion of this crop was destroyed. The fruit trees in the more newly planted orchards were making satisfactory progress. The trees in the nut orchard had made good growth, and considering their age were bearing well. The forest and ornamental trees were making rapid growth, and many of the shrubs and flowers blooming well. An additional area of land has been cleared to provide for increased pasturage and an enlargement of the orchards and to give additional areas for field crops in the near future.

The stock including the pure bred short-horns recently sent from Ontario were doing well, and the swine, sheep and fowls were all making satisfactory progress.

In the interior of British Columbia the fruit crop was said to be good and of excellent quality, but the limited time at my disposal prevented me from visiting any of these districts this year.

ACKNOWLEDGMENTS.

It gives me much pleasure to acknowledge gratefully my obligations to those who have rendered me special services. To the United States Department of Agriculture to whom I am indebted for a number of different sorts of cereals and other farm crops, to Dr. C. Doxrud, of the Technical School, of Christiania, Norway, for samples of cereals and other agricultural products grown in Norway. To the Director of the Royal Gardens, Kew, England, for seeds of trees, shrubs and plants from many countries, and to the Director of the Arnold Arboretum, Jamaica Plains, Mass., for seeds of promising shrubs. Also to Prof. John Macoun, Naturalist of the Geological and Natural History Survey, and Mr. J. M. Macoun, assistant naturalist, for seeds of interesting Canadian plants.

Acknowledgments are also due to the officers at the Central and Branch Experimental Farms, for faithful services rendered and for their earnest co-operation in carrying out the many lines of work planned.

My hearty thanks are also due to those members of the staff who have rendered me help in those branches of the work over which I have had personal charge; to the horticulturist, Mr. W. T. Macoun, who has supervised the labour given to the trees and shrubs, and to the lawns on the experimental grounds; to the farm foreman, Mr. John Fixter, who has carefully watched over the different branches of the work, has taken special charge of the experiments with fertilizers and made the notes thereon, he has also helped me much by many practical suggestions; to Mr. George Fixter, who has managed the work connected with the experimental plots of cereals, fodder crops and field roots, and has taken records of the growth and yield of all these, and has thus aided me much in furnishing material for the preparation of this report, to him I am also indebted for the careful management of the many details connected with the dis-

tribution of samples of seed grain, and to Mr. Wm. Ellis, who has done careful work in testing the vitality of seeds, in the management of the greenhouse plants, in the propagation of many useful and ornamental species and in the taking of the meteorological records.

I desire also to acknowledge the faithful services of my secretary, Mr. Malcolm O'Hanley, to whose energy and industry I owe much of the success which has attended my general work. The employees also of all the farms in every branch of work are deserving of mention since they have shown commendable care and have faithfully discharged their respective duties.

WM. SAUNDERS,
Director Experimental Farms.

REPORT OF THE HORTICULTURIST.

(W. T. Macoun.)

Wm. Saunders, Esq., LL.D.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit, herewith, the fifteenth annual report of this division. During the past year many experiments were made with trees, shrubs, herbaceous plants, fruits, and vegetables, and a large amount of useful data was obtained, but owing to the necessarily limited space available, only that which it seems most desirable to publish is given.

Character of Season.—Last winter was very unlike the previous one, for, while the weather during the winter of 1899-1900 was very changeable, that of 1900-1 was quite the contrary, and was noted for its long spells of cold weather. The winter set in very early, as snow fell on November 14, and remained. On account of this early fall of snow, and more following before very cold weather, the ground was protected from frost, and there was practically no frost in the ground all winter, a very unusual occurrence at Ottawa.

December was a cold month, the temperature falling to 18·8° F. below zero on the 10th. There was a considerable quantity of snow, and by Christmas there were fully 18 inches on the ground.

During the month of January there was very little mild weather, and no real thaw. The lowest temperature was on the 20th, when it was 25·5° F. below zero, which was the coldest day of the winter. During that month the snow increased in depth, and by the end of the month there were fully three feet on the ground. February was a very cold month, and the temperature did not rise above the freezing point from January 22 to March 2. While there were no heavy falls of snow in February, that which came remained. The snow did not apparently begin to get less until about the middle of March, and then it went slowly, as the weather was not warm, and it was very cloudy from March 21 to April 10. After April 1, the weather became considerably milder, and when it became bright on April 10, the snow was all gone except in the drifts. The heavy covering of snow all winter and the absence of frost in the ground afforded good conditions for the wintering of herbaceous plants, and such things came through well, the strawberries, especially, being in fine condition. There was, however, an unusual injury in the nursery among the young apple trees, as the bark of many of them was badly split within a foot of the ground. The trees grew until very late last autumn and the snow fell early on the unfrozen ground when the young trees were well charged with sap. The cause of the splitting was probably due to the fact that the snow prevented the frost from reaching the lower part of the trunk until very cold weather came, and then the severe frost caused the bark to burst.

Many ornamental trees and shrubs which have been quite hardy or nearly so in the past had a large amount of wood killed by winter. Fruit trees also suffered in their tops much more than usual, while raspberry canes were badly injured, and in consequence the crop was practically a failure in this district.

As there was no frost in the ground, it was only necessary to wait until the snow disappeared and the soil dried sufficiently to begin outside work. The first ploughing of the season was done in the orchard on April 12, and hand labour on April 8.

The spring continued very favourable for work, and there was scarcely any frost

after the early part of April. The warmest day in April was on the 28th, when the temperature was 79·8° F. Everything was well advanced by the middle of May, and at that time the season was fully a week earlier than in 1900. The warmest day of the month was on the 8th, when the temperature rose to 81·2° F.

There had been very little rain all spring, but beginning with May 10, there were few days on which it did not rain until after June 3. This long period of rainy weather had a bad effect on the setting of fruit, as the conditions for the fertilization of the flowers were very unfavourable. As a result, the crop of apples, plums, and grapes was much lighter than it would probably have been otherwise.

June was a warm month all the way through, and beginning with the 24th it was hot, the temperature rising to 96·8° F. on the 28th. This hot weather continued till July 2, when the heat moderated, but from July 12 to 18, there was another hot spell, the highest temperature of the year being recorded on the 16th, when it rose to 99° F. This hot weather lessened the strawberry crop considerably, and was very injurious to potatoes, except where there was thorough cultivation. August was also a warm month, but not as warm as July. September was mild to warm. The first frost, which was a very light one, occurred on the 20th, when the melon vines were injured, but tomatoes were not hurt. There was a very high wind on the 28th which blew off a great quantity of apples and blew down several trees. The weather was fine and mild in October and very favourable for fall work. The temperature did not fall below 30° F. until the 28th, when it went down to 27° F., killing the foliage of the grape vines. Up to this time such tender plants as Cannas had not been killed, and in sheltered places tomato vines were still green. The early part of November was also very favourable for outside work. On the 13th there was a heavy rain, which, freezing on the trees, weighed down the branches very much and many were broken, the cut-leaved birches suffering most of all. Four inches of snow fell on the 14th and remained, and winter may be said to have set in on that date.

Fruit Crop.—The season of 1901 was not, on the whole, a favourable one for fruit. Owing to very rainy weather during the blossoming season the apples, plums, and grapes did not set their fruit as well as usual, but there was not a good show of bloom on the apple trees from the outset, and the crop of this fruit was small, but of good quality. There was a fair crop of American plums, but the flower buds on the European varieties were winter killed, and hence there was no fruit from them. The pears had been so badly blighted in 1900 that there were few of the trees in condition to bear fruit, and hence there was practically none of that fruit. The flower buds of the cherries were killed by winter, and there was no crop. The raspberry crop throughout the Ottawa district was practically a failure, the canes having been badly injured by winter and in many cases killed outright. Although bent down at the experimental farm, for greater protection, they suffered badly, and there was a very light crop of this fruit. Strawberries came through the winter well and promised a very heavy crop, but hot, dry weather came during the ripening season which lessened it considerably, though the crop on the whole was good. The grapes ripened well, but owing to poor fertilization of the flowers the crop was light.

The potato crop, which was light in the Ottawa district, was good at the Farm. Tomatoes ripened well and there was a large crop this year. This was a favourable season also for tobacco, the yield being good, and most varieties were well matured.

PROGRESS OF THE WORK.

The work of the Horticultural Division continued to progress favourably this season, and most of the experiments undertaken in former years were carried on again.

During last winter a bulletin of 74 pages on Apple Culture was prepared by the Horticulturist and published in April, 1901. There has been a great demand for this bulletin, and it is hoped that it will prove useful to Canadian fruit-growers.

The top grafting of the more tender varieties of apples was continued again this year, though many of those grafted in the past suffered from blight in 1900 and were injured by frost last winter. There is still good evidence, however, of the value of top grafting some kinds which would not otherwise succeed here.

A seedling apple orchard was begun this season, and 494 trees planted, most of which had been grown from seed of apples ripened here. It is hoped that from these seedlings a productive, hardy, late-keeping dessert apple of good quality will be obtained, as such a variety is much needed here.

Many new varieties of apples were obtained from various sources, some of which were root grafted and others top grafted. The number of varieties in the orchard was also increased by young trees from the nursery.

The American plums are proving very useful in this district, and there is now a large collection of named varieties in the orchard. As they fruit, these are described and those found the most satisfactory recommended for planting. A large number of seedlings have been raised from some of the best sorts, and as they fruit they too are tested and described, and if found to be of inferior merit, discarded. A few sorts of great promise have already been obtained.

A new currant plantation was made last spring containing 111 varieties ; a strawberry plantation containing 218 varieties, and this autumn a raspberry plantation was made of 63 varieties.

Many experiments with vegetables were conducted this year, and the average results of some which have been carried on for five and six years obtained, which are very valuable as a guide to farmers and market gardeners. The List of Best Vegetables for Farmers, published in this report, gives in a concise form the conclusions reached regarding the merits of the different sorts.

Experiments in testing different varieties of tobacco were continued, and the crop was harvested in good condition and cured in the tobacco house. This was a favourable year for tobacco, it having ripened and cured well.

Measurements were again taken in the forest belts of the annual growth in height and circumference of the different kinds of timber trees, and new plantations were made where other trees had not succeeded.

The Arboretum never looked better than it did this year. Large additions were made to the collection of herbaceous perennials, and some new sorts of trees and shrubs were planted. Five hundred and twenty-five species and varieties were obtained last spring and planted in nursery rows and will be put in their permanent positions next spring. Notes were made again this year on the hardiness and growth of the different species and varieties.

As in the past, the correspondence has occupied considerable time, but this is one of the best means of conveying information obtained from the experiments conducted here direct to those who are most anxious to get it.

The experiments made with a lime-mixture for the destruction of the oyster-shell bark-louse were continued last winter, and additional experience gained as to the value of this remedy. Bordeaux mixture and Paris green were used very faithfully in spraying for fungous diseases and biting insects, and the good results from these applications were, as a rule, very apparent. Other mixtures and solutions were used in smaller quantities.

Meetings attended and Places visited.—I had the pleasure of attending eight meetings during the past year, and while there endeavoured to be of as much service as possible to the farmers and fruit-growers with whom I came in contact.

At the meeting of the Nova Scotia Fruit Growers' Association, held at Wolfville, N.S., on January 28, 29 and 30, I gave an address on 'The Development of

Spraying in Canada,' and at the meetings of the Farmers' Associations, at Kentville, N.S., an address on 'Potato Culture.' From Nova Scotia, I went to Prince Edward Island, attending a special meeting of fruit-growers at Cardigan on February 5, and the meeting of the Farmers' Association at Middleton on the 8th. The meeting of the Prince Edward Island Fruit Growers' Association was held at Charlottetown on February 6 and 7, at which I gave an address on 'Apple Growing.' It was also my pleasure to attend the summer meeting of the Quebec Pomological Society, held at Rivière du Loup, Que., on August 20 and 21, where I gave a lecture on 'Hardy Fruits.' On September 12 and 13, I was present at the meeting of the American Pomological Society at Buffalo, N.Y., and delivered an address on 'Orchard Renovation'; and at the meeting of the Ontario Fruit Growers' Association, held at Cobourg, Ont., on December 4, 5, and 6, I gave a talk on 'The American Plum.'

While at Buffalo, in September, I visited the Pan-American Exhibition and studied the fruit in the large collections there, and during the same absence from home I visited the Agricultural Experiment Station, at Geneva, N.Y., and the Experiment Station at Cornell University, Ithaca, N.Y., in order to learn something of the work being done at these stations and something which would be helpful in my work at Ottawa. Returning homewards, I visited several fruit farms in the Grimsby district and examined the trees and crops there. During the autumn, I also visited the orchards and nursery of the Trappist Fathers at Oka, P.Q., and found much of interest there. At the same time I visited the orchards of Mr. R. W. Shepherd, Como, P.Q., where there was much to be seen that will be useful to me.

Acknowledgments.—I have much pleasure in acknowledging, and am very grateful for, the many kindnesses shown me by fruit-growers both in Canada and the United States. Information which it was necessary to have, in order to do my work with greater accuracy, has been freely given by many fellow-workers, and I fully appreciate the value of such help. To the fruit-growers of Ontario and Quebec, who assisted me in getting the necessary data to compile the district apple lists for my bulletin on Apple Culture, I am particularly grateful, as the ready response to my inquiries made it possible to make the lists much more accurate than they would have been otherwise.

I again take the opportunity of acknowledging the services of Mr. J. F. Watson, secretary to the Horticultural division, whose knowledge of the work relieves me of much office work which he is thus able to do himself. Mr. H. Holz, the foreman, continues to superintend the outside work satisfactorily, and I am pleased to note the great interest he takes in it.

Donations.—The following donations were received during the year, and this opportunity is taken to gratefully acknowledge the same :—

DONATIONS.

Sender.	Donations.
Arboretum, Arnold, Jamaica Plain, Mass., U.S.	Seeds.
Beall, Thos., Lindsay, Ont..	Scions of late red apple.
Beach, Prof. S. A., Geneva, N.Y....	Grape cuttings.
Botanic Garden, Durban, South Africa.....	Seeds.
Botanic Garden, Madras, India....	Seeds.
Brodie, R., Montreal, P.Q.....	Scions of a red Fameuse apple.
Cockburn, J. C., Gravenhurst, Ont.....	Scions of Nora, Minto, and Sally Brown apples.
Dempsey, W. H., Trenton, Ont.....	Samples of 44 varieties of fruit. Apple scions.
DeWolfe, M. G., Kentville, N.S.....	Bulbs.
Dupuis, Aug., Village des Aulnaies, Que.....	Tree and scions of Amaryllis plum, and seedling apple scions.
Fonthill Nurseries, Fonthill, Ont.....	Scions of 8 Japanese plums.
Guay, A. E., Ville Marie, Que....	Currant cuttings.
Hamilton, Robert, Grenville, Que.....	Childs and Blair crab apple scions.
Hodgins, A. S., Osnabruck Centre, Ont..	Apple scions.

DONATIONS—*Concluded.*

Sender.	Donations.
Hutt, Prof. H. L., O.A.C., Guelph, Ont.	24 plants of Irene and Jucunda strawberries.
Iowa Horticultural Society, Davenport, Ia.	Plum scions.
Jack, N. E., Chateauguay Basin, Que.	Scions of Cox's Orange Pippin apple.
Kerr, W. J., Renfrew, Ont.	50 plants Shaffer raspberry.
Knox, A., Chesterfield, Ont.	Apple scions.
Lalonde, A., Isle Perrot, Que.	Scions of unknown apple.
Lathe, H., Lacolle, Que.	Apple scions.
Leonard, E., Cobourg, Ont.	Scions of unknown apple.
Macoun, J. M., Geological Survey, Ottawa.	Seeds.
Matheson, Miss Joan, Perth, Ont.	Scions of Rufus apple.
McFarland, F. H., Hyde Park, Vt., U.S.	Scions of Roseau, McLure Pippin, Russian, Baldwin, Aurora, and Corliss Red apples.
Royal Botanic Gardens, Kew, England.	Collection of seeds.
Sears, F. W., Snow View Garden, via Naini Tal, N.W.P., India.	100 nuts of *Juglans regia*.
Shepherd, R. W., Como, Que.	Scions of Early Joe and La Rochelle apples.
Stubbert, G. E., Little Pond, C.B., N.S.	Apple scions.
Terrill, A. M., Picton, Ont.	Seeds of Terrill's Early tomato.
Tuttle, A. G., Baraboo, Wis., U.S.	Scions of Repka Malenka apple.
Van Fleet, Dr. W., Rural New Yorker, N. York.	*Rosa wichuriana hybrid.*
Walker, Jos., Strathroy, Ont.	Scions of unknown apple.
Wallenshlager, C., New Edinburgh, Ont.	Scions of seedling apple.
Wilkins, O. F., Bridgebury, Ont.	Seedling grape cuttings.
Young, Charles, Richard's Landing, Ont.	Scions of seedling apple.

I have the honour to be, sir,

Your obedient servant,

W. T. MACOUN,
Horticulturist.

APPLES.

While there was practically no root-killing in the apple orchard last winter, trees died on account of the severe weather, evidently being weakened by blight in 1900. There was more injury to the tops of the trees than there has been for some years, probably due to long continued cold, dry weather, which caused more evaporation of moisture than the trees could stand.

Two trees each of Ben Davis and Stark, the former planted in 1890, and the latter in 1891, were killed outright, and two trees of Gano, planted in 1891, were much weakened. These are given as examples of comparatively hardy varieties which were affected by last winter. During the summer 17 trees were blown down and in nearly every case the trunk was rotten almost entirely through. These trees had all been planted since 1887. Every year a number of trees go in this way, and it is difficult to tell what is the real cause, as it is not restricted to the tenderer varieties, but even the so-called iron clads rot in this way. The orchard has suffered much in past years from blight and root-killing and many trees are affected with the so-called black heart, and all these combined weaken them very much. The trees on the whole, however, look healthy and have been improving in this respect from year to year. The Russian orchard, comprised mostly of varieties of Russian origin, looks particularly well, the trees being healthier than in the standard orchard.

The crop of apples was light this year. There was not a good show of bloom to begin with and the wet weather which occurred during the blossoming season was very unfavourable to the pollination of the flowers, the result being that comparatively few apples set. Varieties which had good crops on some trees were McMahon White, Wealthy, Patten's Greening, Duchess of Oldenburg, Haas, Cross, Longfield, and Salome.

There was little blight in the orchard this year, and the season was a favourable one for growth. The cover crop in a large part of the standard orchard was ploughed under on April 13, and after cultivating several times to kill sod, the ground was re-sown with common red clover at the rate of 12 lbs. per acre on June 4, which resulted in a good stand. The cover crop in all the Russian orchard was ploughed under on April 23, and the soil kept cultivated until July 29, when it was re-sown with clover, and there was a fine cover crop by autumn. In other parts of the standard orchard the clover was cut at intervals and allowed to rot, as has been the custom in previous years.

In the spring, 86 trees were planted in the apple orchards. Of these, 69 were to fill vacancies, and 19 were planted in an additional row which was made to the Russian orchard. The vacancies were caused by death and by the rooting up of trees of inferior varieties. The Tetofsky has not been found a profitable apple here, although the tree is very hardy. It is inclined to overbear, and the fruit is small and drops badly. In 1888, there were 40 trees planted of this variety, 27 of which were living last spring, and as the space was required for the testing of other kinds, 13 of these were removed.

During the past season the early varieties were sprayed three times, and the late varieties four times with Bordeaux mixture and Paris green, and the fruit was practically free from spot, though the Codling Moth did some injury. Last autumn 47 trees, which were more or less affected by the Oyster-shell Bark-louse, were sprayed with the lime mixture, and the results were very satisfactory, there being few scales left on the trees. The trunks of the trees and large branches were washed with the alkaline wash for the prevention of borers. This wash is made by reducing soft soap to the consistency of thick paint by the addition of a strong solution of washing soda in water, and is applied with a brush. Only two borers were found in about 1,200 trees, showing that the orchards are practically free from this insect.

Last winter was a very hard one on the young top grafted trees and some which had come through two winters without injury were killed outright. The blight of 1900 also had done much injury, both to the stocks and grafts, as a result there was a great set-back to this work. However, some varieties are doing well. The work was continued last spring and additional trees were grafted and others finished which had been begun in previous years.

SEEDLING APPLE ORCHARD.

Most of the named varieties of apples growing in America to-day were originated as seedlings. Our forefathers brought apple seeds with them from the old land and sowed them in this country. The young trees raised from these grew up and bore fruit, and occasionally a variety of merit would thus be produced, and then propagated. In later times chance seedlings grew up in the fence corners and other waste places, and these also bore fruit and added their quota of good sorts. From trees like these have originated such fine varieties as Northern Spy, Baldwin, Fameuse, McIntosh Red, and many others.

Of late years more systematic efforts have been made to originate new varieties from seed. But the varieties of really useful apples which have originated in this way have been very few indeed.

At the Central Experimental Farm at Ottawa, considerable work has been done in raising seedling apples, especially from seed of Russian varieties, but no kinds of great merit have yet been produced.

In the year 1890, an orchard was planted comprising about 3,000 trees grown from seed imported from E. Goeggінger, Riga, Russia. The seed from which these were grown was said to have been taken from apples grown north of Riga, Russia. Of these there are now 898 remaining, the rest having been killed by blight or winter or removed on account of weak growth or inferior quality. These began to fruit in 1897, when about 50 trees bore. In 1898 there were 40 trees which fruited ; in 1899 there were 43 ; in 1900 there were 26, and in 1901 there were 18, making a total of 177 trees which have borne fruit. None of these apples are sufficiently promising to be worthy of special mention, but a few of them are as good as the majority of the named Russian varieties. Nearly all of them are summer apples.

As the Russian seedling trees had not produced any varieties of great merit (unless it be found that they are hardier than other kinds) it was decided to grow a large number of seedlings from the best varieties which had fruited at Ottawa, in order to try and obtain something good from them. Accordingly, seeds were sown in 1898, 1899 and 1900, and a large number of seedling apple trees raised from them, and this year 494 were planted out in the pear orchard, places being left for the permanent pear trees. The trees were planted 10 by 10 feet apart in most cases. The soil was kept thoroughly cultivated, and the young trees made thrifty growth. The trees were made up of the following :—79 seedlings of McIntosh Red, 65 Lawver, 63 Shiawassee Beauty, 53 Wealthy, 53 Swayzie Pomme Grise, 39 Scott's Winter, 39 Winter St. Lawrence, 26 Northern Spy, 25 American Golden Russet, 10 St. Lawrence, 9 Edgehill, 6 Gano, 5 Fameuse, 3 Salome, 1 Ribston Pippin, 1 Pewaukee, 17 miscellaneous (fruit not ripened here) ; total, 494.

In addition to these, the following hybrids, originated by Prof. John Craig, were planted :—5 Pyrus baccata, female, with Duchess of Oldenburg, male ; 8 Pyrus baccata, female, with Tetofsky, male ; 21 Pyrus baccata, female, with Martha, male ; a total of 34 trees.

SEEDLING APPLES.

Notwithstanding the poor crop of fruit this year, a number of seedlings were sent in for examination and description, among which were several of merit. It is always a pleasure to examine these fruits, and we trust that every year those who have new varieties will send them to the Horticulturist that he may compare them with other varieties.

Full descriptions are published of the most promising of those which were received :—

No. 203.—R. Hamilton, Grenville, Quebec. Apple seedling.—Size, medium to below, roundish, yellow, splashed and washed with deep red ; cavity deep, medium width ; basin deep, medium width, wrinkled ; stem short, slender ; calyx closed ; dots obscure ; skin thin but tough ; core, small ; flesh, white, crisp, very tender, juicy, tinged with red to core ; sub-acid, with a pleasant but peculiar flavour ; quality, good to very good ; season, December, January. Evidently a Fameuse seedling. Tested January 23, 1901.

No. 204.—Joshua Bull, East Farnham, Quebec. Apple seedling.—Above medium size, roundish to oblate, pale greenish yellow, splashed and washed with carmine ; cavity, medium depth, open ; basin, deep, medium width, wrinkled ; stem, medium length, slender ; calyx, closed ; dots, obscure ; skin, thin, moderately tender ; core, small ; flesh, white, tinged with red, tender, juicy ; mild sub-acid, with a pleasant flavour ; quality, good ; season, early October. Said to be a seedling raised by Joshua Bull, East Farnham, Que. Might prove useful if a good cropper. Tested October 15, 1901.

No. 205.—J. P. Jones, Echo Vale, Que. Apple seedling.—Large, roundish conical, pale greenish yellow, splashed and washed with carmine ; cavity, deep, medium

width, slightly russetted ; basin, medium depth and width, wrinkled ; stem, short, moderately stout ; calyx, closed ; dots, obscure ; skin, moderately thick, tough ; core, small ; flesh, dull white, tender, juicy ; sub-acid ; quality, good ; season, early winter. May be a desirable apple if tree is very hardy. Tested November 4, 1901.

No. 206.—A. Dupuis, Village des Aulnaies, Que. Apple seedling.—A medium sized, very productive apple of medium quality.

No. 207.—Thos. Armstrong, Springdale, Ont.—Stanleydale, apple seedling.—A large, pale yellow apple, lightly splashed with pink on sunny side ; quality, above medium ; season, evidently from mid to late September.

No. 208.—C. A. Cass, L'Orignal, Ont. Apple seedling.—Above medium size, roundish, pale yellow, almost covered with deep red, but a few patches only streaked with it ; cavity, deep, medium width ; basin, medium depth and width, wrinkled ; stem, medium length, moderately stout ; calyx, closed ; dots, moderately numerous, small, distinct, but not prominent, yellow ; bloom, rather heavy ; core, medium size ; flesh, white, tinged with red, crisp, juicy ; sub-acid, with a pleasant, Fameuse-like flavour ; quality, good ; season, probably early to mid September. A promising apple very much resembling Russell. Tested September 3, 1901.

No. 209.—Miss Joan Matheson, Perth, Ont.—Rufus, apple seedling.—Medium size, roundish conical, pale yellow, well washed with crimson ; cavity, narrow, medium depth, russetted ; basin, narrow, shallow, slightly wrinkled ; stem, short, slender ; calyx, closed ; dots, numerous, pale yellow, distinct ; bloom slight ; skin, moderately thick, tough ; core, small ; flesh, white, tinged with pink almost to core, juicy, tender ; sub-acid, pleasant flavour ; quality, good, almost very good ; season, mid-winter to late winter. Probably a seedling of Fameuse. Tested April 20, 1901.

No. 210.—E. Leonard, Cobourg, Ont.—Unknown apple.—Above medium size, roundish, conical, green, splashed and washed with deep red ; cavity, rather shallow, open ; basin, narrow, shallow, wrinkled ; calyx, medium size, closed ; dots, fairly numerous, pale, distinct, but not prominent ; skin, thick and tough ; core, medium size ; flesh, yellowish white, crisp, tender, juicy ; sprightly sub-acid, pleasant flavour ; quality, very good ; season, late winter.

No. 211.—T. W. Gibbs, Huntsville, Ont.—Apple seedling.—Above medium size, roundish conical, pale greenish yellow, splashed and washed with carmine ; cavity, medium depth and width ; basin, narrow, medium depth, slightly wrinkled ; stem, short, moderately stout ; calyx, closed ; dots, obscure ; skin, moderately thick, tough; core, medium ; flesh, white, tender, juicy ; sweet, pleasant flavour; quality, good for a sweet apple ; season, October. A good sweet apple for its season. Tested October 9, 1901.

No. 212.—C. Wallenshlager, New Edinburgh, Ont.—Large winter apple seedling.

Nos. 213 to 216.—Thos. Frankland, Stonewall, Man.—Maude, Laura, Myrtle, and Annie apples. All small apples which may prove valuable in Manitoba.

No. 217.—N. E. Jack, Chateauguay Basin, P.Q.—Norman, apple seedling.—Above medium to large, roundish, greenish yellow, well washed and splashed with deep red with a purplish tinge ; cavity, deep, medium width ; stem, short, moderately stout ; basin, narrow, medium depth, slightly wrinkled ; calyx, closed ; dots, small, yellow, moderately numerous, distinct ; skin, thick, moderately tough ; core, medium; flesh, yellow, juicy, rather coarse, mildly sub-acid ; quality, good ; season, mid-winter to late winter. A promising winter apple. This apple was partly described in the report of the Montreal Horticultural Society for 1883. It originated at Chateauguay Basin, P.Q., and was first brought to notice by the late Robt. Jack, of that place.

SESSIONAL PAPER No. 16

VARIETIES OF APPLES, NEW OR NOT WELL KNOWN IN ONTARIO AND QUEBEC.

For a number of years descriptions of apples have been published in the annual reports of the Horticulturist, most of which were of new or little known varieties. In a bulletin on Apple Culture, published this year, 53 kinds of apples were described, most of which were standard varieties. As there are so many new kinds continually appearing, it has been thought best to continue the work of describing the newer or not well known sorts.

Akin Red.—Fruit, oblate to roundish, slightly angular ; medium size ; cavity, medium depth to deep, open, sometimes irregular on one side ; stem, medium length, slender ; basin, medium depth and width, slightly wrinkled ; calyx, medium size, partly open ; colour, yellow, almost covered with bright rich red or crimson ; dots, numerous, yellow, district, not prominent ; skin, thin, moderately tough ; flesh, yellowish, crisp, juicy, very tender, melting ; core, medium ; mildly sub-acid, pleasant flavour ; quality, very good ; season, mid-winter to late winter. A very beautiful apple. Promising. Received from W. C. Reid, Belleville, Ont., and described January 8, 1901, also from W. H. Dempsey, Trenton, Ont., and described December 10, 1901.

Babbit.—Fruit, oblate, conic, angular, large ; cavity, deep, narrow, russetted ; stem, short, slender ; basin, narrow, medium depth, wrinkled ; calyx, medium size, open ; yellow, well washed and splashed with red with orange shade ; dots, few, yellow, distinct, but not prominent ; flesh, yellow, juicy, coarse, briskly sub-acid or acid, little character ; core, medium size ; quality, medium ; season, late winter. Grown at C. E. F. ; described January 4, 1901.

Baraboo.—Fruit, roundish to oblate, large ; cavity, deep, narrow, slightly russetted, wrinkled ; stem, short, moderately stout ; basin, medium depth and width, slightly wrinkled ; calyx, closed ; pale greenish yellow, lightly splashed and streaked with bright purplish red (carmine) ; dots, fairly numerous, pale, indistinct ; skin, moderately thick, tender ; flesh, yellowish, crisp, juicy ; core, small ; briskly sub-acid ; quality, above medium ; season, early to mid-September. May be useful for season following Duchess, which it resembles somewhat. Grown at C. E. F. Described September 6, 1901.

Boiken.—Fruit, oblate, angular, large ; cavity, deep, open, slightly russetted at its base ; stem, short, slender ; basin, deep, medium width, slightly wrinkled ; calyx, large, open ; pale yellow with bright reddish pink blush ; dots, fairly numerous, distinct, prominent on blushed part ; skin, thick, tough ; flesh, yellowish, crisp, tender, juicy ; core, medium size, open ; briskly sub-acid, not high flavour ; quality, good ; season, late winter. Received from W. H. Dempsey, Trenton, Ont. Described December 8, 1900.

Downing's Winter Maiden's Blush.—Fruit, oblate, large ; cavity, medium depth and width ; stem, short, stout ; basin, deep, medium width, smooth ; calyx, closed ; yellow with a pink blush, handsome ; dots, moderately numerous, pale yellow ; skin, thick, tough ; flesh, yellowish, buttery, juicy ; core, medium size ; mildly sub-acid, pleasant flavour ; quality, good ; season, mid-winter. Received from W. H. Dempsey, Trenton, Ont. Described December 24, 1901.

Duffey's Seedling.—Fruit, oblong conical, above medium to medium ; cavity, medium depth, narrow ; stem, short, moderately stout ; basin, shallow to medium depth, medium width, wrinkled ; calyx, open ; yellow, well washed with deep red ; dots, fairly numerous, yellow, distinct, prominent ; skin, moderately thick, tender ; flesh, yellow, tender, rather coarse, moderately juicy ; core, medium size ; sub-acid,

peculiar flavour, spicey, not altogether pleasant ; quality, above medium ; season, late winter. A handsome apple and a good keeper. Received from W. H. Dempsey, Trenton, Ont. Described January 4, 1901.

Early Joe.—Fruit, oblate, medium size ; cavity, deep, open ; stem, short, stout ; basin, medium depth and width, smooth ; calyx closed ; yellow, well washed and splashed with bright red with a pink tinge ; dots, numerous, yellow, distinct, prominent ; skin, thin, tender; flesh, yellow, juicy, tender, melting ; core, small ; sub-acid, sprightly, pear-like, pleasant flavour ; quality, very good to best ; season, mid-September to late September. Specimens received from R. W. Shepherd, Como, Que. Described September 19, 1901. An old variety.

Edgehill.—Fruit, oblate, flattened, large to above medium size ; cavity, deep, medium width, russetted ; calyx, closed, or partly open ; stem, short, moderately stout ; basin, deep, open, to medium, almost smooth ; yellow, heavily splashed and washed with dark purplish red ; dots, yellow, moderately numerous, distinct ; skin, thick, tough ; flesh, white, tender, juicy ; core, small ; sub-acid, pleasant flavour, good ; quality, good ; season, early winter. This is a good dessert apple. The flavour is somewhat like St. Lawrence. Grown at C. E. F. Described November 11, 1901.

Fameuse Sucré.—Fruit, oblate, flattened, medium size ; cavity, open, deep ; stem, medium length, moderately stout ; basin, medium depth and width, wrinkled ; calyx, closed ; pale yellow almost entirely washed or splashed with crimson ; dots, moderately numerous, purple, indistinct ; skin, moderately thick, tough ; flesh, white, crisp, tender, juicy, Fameuse-like ; core, small ; mildly sub-acid, pleasant flavour ; quality, very good ; season, mid to late September. Very similar to Fameuse in character of flesh and somewhat in flavour. Colour of skin is also very similar to Fameuse. Specimens received from R. W. Shepherd, Como, Que. Described September 19, 1901. Mr. Shepherd is not certain whether this is true to name.

Hamilton.—Fruit, oblate, above medium to large ; cavity, deep, open, russetted ; stem, short, moderately stout ; basin, deep, open, slightly wrinkled, almost smooth ; calyx, open ; pale yellow with a pink blush ; dots, fairly numerous, indistinct ; skin, moderately thick, tender ; flesh, yellowish, tender, moderately juicy ; core, small ; sub-acid, pleasant flavour ; quality, good or almost good ; season, late October, November. Not attractive enough looking to be very promising. Grown at C. E. F. Described November 8, 1901.

Horn.—Fruit, roundish, below medium size ; cavity, medium depth and width ; stem, medium length, slender ; basin, shallow, open, almost smooth ; calyx, medium size, closed, or partly open ; skin, yellow, almost covered with deep crimson ; dots, fairly numerous, medium size, yellow, conspicuous ; skin, moderately thick, tough ; flesh, yellow, tinged with red, juicy, very tender ; core, medium ; sub-acid, medium ; quality, good ; season, early winter. A very handsome apple. Received from W. H. Dempsey, Trenton, Ont. Described November 10, 1900.

Jefferis.—Fruit, oblate, size, medium to above ; cavity, deep, open, slightly russetted ; stem, very short, slender ; basin, deep, open, smooth; calyx, open ; pale yellow splashed and washed with crimson ; dots, fairly numerous, yellow, distinct ; skin, moderately thick, moderately tender ; flesh, yellowish, tender, melting, juicy ; core, small ; mildly sub-acid, pleasant flavour, good ; quality, very good ; season, September to mid-October. A fine dessert apple. Received from W. H. Dempsey, Trenton, Ont. Described November 2, 1901. An old variety.

Kinnaird.—Fruit, roundish, prominently angular, above medium size ; cavity, medium depth and width ; stem, short, stout ; basin, medium depth and width, wrinkled ; calyx, medium size, open ; greenish yellow, well washed and splashed with

deep, dull red ; dots, few, obscure ; skin, thick, tough ; flesh, yellow, crisp, tender, moderately juicy ; core, small ; sub-acid, pleasant flavour ; quality, good ; season, mid-winter to late winter. Grown at C.E.F. Described January 8, 1901.

Rochelle.—Originated with R. W. Shepherd, Como, P.Q. Fruit, roundish, obtusely conical, large ; cavity, deep, medium width ; stem, short, moderately stout ; basin, deep, medium width ; calyx, open ; colour, yellow, well splashed and washed with bright purplish red ; dots, fairly numerous, yellow, distinct, but not prominent ; skin, moderately thick, moderately tender ; flesh, yellowish, crisp, firm, juicy ; core, small to medium ; sub-acid, pleasant flavour ; quality, good ; season, early to near mid-winter. A large, handsome apple. Specimens from W. H. Dempsey, Trenton, Ont., and from R. W. Shepherd, Como, P.Q. Described November 27, 1901. For further information regarding the origin of this variety, see report of the Horticulturist for 1896, where it is already described.

Milding.—Fruit, oblate, large ; cavity, medium depth and width, russetted ; stem, short, stout ; basin, medium depth, open, almost smooth ; calyx, open ; greenish yellow, splashed and washed with purplish red mostly on sunny side ; dots, few, small, yellow, indistinct ; skin, thick, tough ; flesh, yellowish, crisp, juicy ; core, medium size, open ; sub-acid, pleasant flavour ; quality, good ; season, early winter. Received from W. H. Dempsey, Trenton, Ont. Described November 18, 1901.

Missouri Pippin.—Originated in Missouri. Fruit, roundish conic, somewhat angular, medium size ; cavity, deep, medium width ; stem, short, slender ; basin, narrow, medium depth, wrinkled ; calyx, small, partly open ; yellow, well splashed and washed with dep red ; dots, fairly numerous, small, yellow, distinct ; skin, thick, tough ; flesh, yellowish, crisp, moderately juicy, rather coarse ; core, small ; sub-acid, pleasant flavour ; quality, good ; season, late winter. Grown at C.E.F. Described December 24, 1901. A hardy variety which may prove useful in this country.

Okabena.—Fruit, oblate, above medium size ; cavity, deep, moderately open to open ; stem, short, to medium, moderately stout ; ; basin, deep, medium width, slightly wrinkled ; calyx, open ; greenish yellow, streaked, splashed and washed with purplish red mostly on sunny side ; dots, few, obscure ; skin, moderately thick, moderately tough ; flesh, yellowish, crisp, tender, rather coarse, juicy ; core, small ; briskly sub-acid ; quality, above medium ; season, late September to early October. Resembles Duchess somewhat in appearance and quality, but is a more oblate apple than Duchess. Grown at C.E.F. Described October 3, 1901.

Palouse.—Originated in Washington Territory. Fruit, roundish to oblate, above medium size ; cavity, deep, open ; stem, medium length, slender ; basin deep, medium width, smooth ; calyx, open ; yellow, well splashed and washed with deep orange red ; dots, fairly numerous, yellow, distinct ; skin, moderately thick, moderately tender ; flesh, yellow, crisp, juicy ; core, medium ; briskly sub-acid, sprightly ; quality, almost good ; season, early to mid-winter. A handsome apple. Flesh not fine grained enough to make a good dessert fruit. Received from W. H. Dempsey, Trenton, Ont. Described November 12, 1901.

Parlin's Beauty.—Fruit, roundish, ribbed (but not prominently), large ; cavity, deep, medium width, russetted ; stem, short, slender ; basin, deep, narrow ; calyx, small, closed ; pale yellow, splashed and washed with bright red, mostly on sunny side ; dots, few, pale yellow, distinct ; bloom, slight ; skin, moderately thick, tough ; flesh, white, juicy, very tender, melting ; core, small ; sub-acid, pleasant but not high flavour ; quality, very good ; season, November. This is a very handsome apple and promising for its season. Received from W. H. Dempsey, Trenton, Ont. Described November 5, 1900.

Patten's Duchess.—Fruit, oblate, above medium size ; cavity, deep, medium width, slightly russetted ; stem, short, slender to moderately stout ; basin, deep, open, slightly wrinkled ; calyx, closed ; colour, greenish yellow, splashed and washed with orange red, mostly on sunny side ; dots, few, large, white, prominent ; bloom, slight ; skin, moderately thick, moderately tender ; flesh, white, crisp, moderately juicy ; core, small ; sub-acid ; quality, above medium ; season, October. Not desirable in this district, as it is not as good as Wealthy. It is a handsome apple. Grown at C.E.F. Described October 15, 1901.

Patten's Greening.—Fruit, oblate, large ; cavity, deep, medium width, russetted ; stem, short ; basin, deep, medium width ; calyx, open, large ; pale yellow with traces of pale green, with a pink blush ; dots, moderately numerous, pale green, distinct ; bloom, slight ; skin, moderately thick ; flesh, yellow, juicy, tender, coarse ; core, small ; sub-acid ; quality, above medium ; season, October to mid-November. Grown at C.E.F. Described October 18, 1901.

Switzer.—Fruit, roundish to oblate, medium size ; cavity, narrow to medium, medium depth ; stem, short to medium, moderately stout ; basin, shallow, medium width, wrinkled ; calyx, closed ; pale yellow, almost white, well washed with bright red ; dots, few, pale, distinct, but not prominent ; bloom, slight ; skin, moderately thick, moderately tender ; flesh, white, crisp, tender, juicy ; core, small ; sub-acid, pleasant flavour ; quality, very good ; season, late August to early September. Not unlike Lowland Raspberry in many respects, but its season is later, and it is more acid, and the flesh is not as melting. Fruit is also not blotched with bright red. Promising. Grown at C.E.F. Described September 3, 1901.

Utter's Red.—Fruit, roundish, large ; cavity, deep, open ; stem, short, moderately stout ; basin, open, medium depth, wrinkled ; calyx, open or closed ; pale yellow, splashed and streaked with bright carmine, mostly on sunny side ; dots, few, indistinct ; skin, thick ; flesh, yellowish, crisp, tender, rather coarse, juicy ; core, medium size ; mildly sub-acid, pleasant flavour ; quality, good ; season, early to mid-winter. Too coarse an apple for a good dessert fruit. Received from W. H. Dempsey, Trenton, Ont. Described November 14, 1901.

Winter Banana.—Fruit, roundish, angular, medium size ; cavity, medium depth, open, slightly russetted ; stem, short, stout ; basin, shallow, open, slightly wrinkled ; calyx, open ; yellow, with a deep red blush ; dots, pale, obscure ; skin, thin, tender ; flesh, yellow, crisp, tender, juicy ; core, medium size, open ; mildly sub-acid, sprightly, good ; quality, very good ; season, mid-winter. Received from W. H. Dempsey, Trenton, Ont. Described January 5, 1901.

PEARS.

Many of the trees in the pear orchard were killed by blight in 1900 and others were badly injured, and although the disease was not as prevalent this year, trees which looked in fairly good health last autumn died in the spring, and it was found that they had been affected the previous year, though the disease had not shown. The only tree which fruited this year was a Bessemianka, which produced a few pears. A number of seedlings of the best varieties are being raised, and it is possible that something which is comparatively blight proof may be originated.

Following is a description of a seedling pear received from E. C. Beman, Newcastle, Ont. :—

No. 218.—E. C. Beman, Newcastle, Ont. Pear seedling.—Large, roundish to obovate, obtuse pyriform ; skin, greenish yellow with a faint bronze tinge on sunny side ; dots, numerous, russet, prominent ; stem, long, stout ; cavity, shallow, open ;

basin, medium depth and width, smooth ; flesh, yellowish, juicy, sweet, tender, melting ; core, small ; quality, good ; season, late October. Promising.

PLUMS.

There was little injury to the plum orchard by winter this year, as far as the wood of the trees was concerned, but the flower buds on the European varieties were all killed, there not being a single fruit of this type of plum. There were a few plums of the Japanese variety known as Botan, but this is of little value here. Some of the Miner type of plums yielded fairly well, but these seldom fruit heavily here. The Americana and Nigra varieties blossomed abundantly, and a number of kinds fruited heavily, but the crop was not an average one on these trees, as the weather during the blossoming season was wet and unfavourable for proper pollination.

There is no doubt that in the Ottawa district, and where the climate is similar, the main dependence must be on the Americana and Nigra plums. These varieties, though not equalling the European plums in richness and tenderness of skin, afford good substitutes where better kinds cannot be grown successfully. The Nigra, or native plum, is thinner in the skin than the Americana, but not as rich. The fruit is also usually badly affected by blight (*Cladosporium carpophilum,* V. Thumen), and unless thoroughly sprayed does not mature, the blight affecting it when it is nearly full grown, causing it to wither and fall to the ground before maturing. The Nigra plum is also more affected by curculio than the Americana, which lessens the crop very much.

The Americana plum is a heavy bearer of handsome plums which, though, as a rule, thick skinned, are handsome and of good quality, though sometimes astringent. During the past few years there have been many named varieties offered for sale and some of these are very good indeed, being much larger and richer than the older sorts.

This year, when there was an abundance of European plums on the market from Western Ontario, the Americana plums, grown at the Farm, sold readily for 50 cents per 12-lb. basket. A tree of Bixby plum, planted in 1893, gave a yield of 11½ gallons, which, at 50 cents for 12-lb. basket was $2.87 worth of fruit from that tree, and in a good season the yield would be much more. The following quotation from a recent letter received from Mr. Alex. Stewart, Hull, Que., a prominent fruit-grower in this vicinity, is evidence as to the esteem with which these plums are held by other growers. He writes :—'I have not fruited a very great number of Americana plums as yet, as my orchard is young, but I am very proud of some of those that I have fruited. Their hardiness, fine appearance, and good quality make them of great value to the fruit grower of Eastern Ontario, and the Ottawa Valley in particular. The best five I have fruited so far are as follows :—Hawkeye, Stoddard, Wolf, DeSoto, Wyant.

'I sold my plums in 10-lb. grape baskets at 40 cents per basket ; 20-lb. baskets of western plums sold for 65 cents per basket at the same time. People will pay a third more for the local fruit. I took eleven 10-lb. baskets of Hawkeye off one tree five years planted. That will pay well. There will be quite a few plums planted about Ottawa next spring. I have given lists of the best varieties to a number of people. In five years from now we will see some good plums about Ottawa, and we may thank the Experimental Farm for their introduction.'

Mr. H. C. Carstesen, Billings Bridge, Ont., who makes a specialty of the native plum, *Prunus nigra,* has also kindly furnished me with some information regarding his success with them. Mr. Carstesen's trees are practically all seedlings of his own raising, some being much better than others. The soil in which they are growing is a heavy clay loam. The trees are kept thoroughly sprayed with Bordeaux mixture to prevent blight. Mr. Carstesen now has between 300 and 400 trees in his orchard, but many of these are young. Some of his trees have yielded from four to five 10-quart

pails each. The following are some figures furnished by Mr. Carstesen of some of his sales.

1898, 79 pails, averaging 80 cents per pail.
1899, 71 pails, averaging 93 cents per pail.
1900, 177 pails, averaging 87 cents per pail.
1901, 149 pails, averaging 82 cents per pail.

Some of the best of the plums sold as high as $1 per pail. Mr. Carstesen could not obtain these prices if it were not that his plums are very early, as they begin to ripen the first week of August and come on the market when there is little competition with other plums. He says that he cannot supply the demand for them.

The following extracts from a letter received from Mr. C. H. Snow, Cummings Bridge, Ont., show that all growers are not favourably impressed with these plums :—

'I cannot give you any encouragement so far as these American plums are concerned. The older the trees grow, the more rotten and miserable they look, and it would take a man doing nothing else but bolting and propping them up. Wherever there is a crotch limb, down it comes by its own weight only. The recent sleet and rain that formed on the trees about 10 days ago pretty nearly finished the best of mine ; in fact, some of the trees of DeSoto will break off at the stump like a clay pipe.

'Now, for the fruit. The astringency in the skin shows up remarkably well when preserved. You should be at the table sometimes and hear the remarks of my children when my wife brings out some Hawkeye plum preserve. There are plenty of our old Canadian plums better for preserves, and if the people would only spray them they would be all right, and so far as selling, they bring a better price per pail, coming in, as they do, the first week in August, before the *Prunus domestica* class are shipped in here. This lateness in ripening is a great drawback. It brings them in straight competition with Lombard, Damsons, Yellow Eggs, and Gages, when sold this year the complaint was that the women folks found the skin too thick. The price paid me for a 2-gallon basket, nearly a pail, was 35 cents. Some of my neighbours got 75 cents and $1 for common wild plums. Still, the price is all right and would pay at this figure if one could sell a large quantity, but the competition is too keen from a much better source, viz. : the European varieties. The varieties so far fruited with me are : Stoddard, Rockford, DeSoto, Hawkeye, Wolf, Weaver, 2 kinds, Black Hawk ; the best of these are Stoddard, Hawkeye, and Wolf.'

It is very true, as Mr. Snow writes, that the trees split easily, and this is a drawback to the Americana varieties which the Nigras or native plums do not suffer from, but if the present market for these plums continues, paying crops will be obtained before the trees are too badly split to produce fruit, and as the trees begin to bear when young they may be replaced. The skin of the Nigra, or Canadian wild plum, breaks up easier in canning and preserving than the Americana, but they are not as rich. The Cheney is one of the best of these. Many of the Americana plums are but slightly astringent when preserved. Hawkeye is one of the poorest for this purpose.

The following recipes for canning and preserving Americana plums, published by Prof. E. S. Goff, in bulletin No. 87, of the Wisconsin Agricultural Experiment Station, Madison, Wis., will prove helpful to those who have not found the plums preserve well :—

'The native plums, especially those with firm pulp, after being treated by any of the methods mentioned below, are well adapted to all purposes for which the foreign plums are used. As a rule, more sugar is required for the native plums, but the preparations are rich in proportion. The harshness in the skin and stone of some native plums is readily removed by steaming them in an ordinary cooking steamer until the skin cracks ; or pour over them boiling water to which has been added common baking soda in the proportion of half a teaspoonful to a quart. The thicker-skinned

varieties may be readily peeled by placing them in boiling water two or three minutes. The recipes follow :—

'*Canning.*—Pick the fruit when well coloured but a little hard, steam or cook in a porcelain-lined kettle until tender, put in cans that have first been treated to boiling water, and cover with boiling syrup made of equal parts of granulated sugar and water, filling the can to the top ; then run a silver knife around the can inside and let out the air, and seal at once. Plums cooked in the syrup are likely to be tough. Canned plums may be used for pies and for mixing with or flavouring other fruits. Plums are often canned without sugar to be used in winter for making fresh plum butter. The juice of canned plums makes excellent jelly.' One lady recommends splitting native plums to the stone on one side before cooking, to avoid crumbling.

'*Drying.*—DeSoto, Wyant and doubtless other varieties may be pared, pitted, and spread on plates, lightly sprinkled with sugar and dried, first in the oven and later in the sun. Cook like dried peaches.

'*Plum Jelly.*—The fruit should be gathered when only part ripe—about half coloured. This point is very essential. Put plums in a large granite or porcelain kettle—the latter is best—with barely enough water to cover them. Cook until tender, but not until they are in a pulpy mass. Having previously covered a large jar with a cloth, strain the fruit in and let the juice drop through, but do not squeeze. When all has drained through, strain once or twice more through another cloth, until the juice is perfectly clear. To one measure of juice provide one measure of granulated sugar, but do not put together at once. A very important point in the making of all jelly is that only a small quantity should be cooked at one time. Into a medium sized kettle put, say, four tumblers of juice ; let it boil briskly 15 or 20 minutes, then add the four tumblers of sugar, and in a very short time—usually from three to ten minutes—the jelly will be finished, light, clear and delicious. To test the jelly, dip a spoon into the boiling juice and sugar and hold it up ; when the jelly clings to the spoon in thick drops, take it off quickly and put into jelly glasses. The plum pulp which is left can be put through a cullender and used for plum butter.'

'Another recipe :—*Plum Preserves.*—Take equal weights of fruit and sugar ; place in stone jar a layer of fruit, then a layer of sugar—alternating thus until quantity desired is reached. Let stand over night ; in the morning drain off the syrup that will have formed into a porcelain-lined kettle, place same over the fire and let syrup come to a boil ; then pour it over fruit in jar again ; repeat this every day until the fourth heating, when fruit and syrup are both put in kettle and boiled for a few minutes. Place same in glass jars while hot, seal and put away in some cool and preferably dark place.

'Still another recipe.—To each pound of plums add a pound of sugar ; put the fruit into boiling water until the skins will slip ; peel and sprinkle sugar upon each layer of fruit in a bowl, allowing them to stand over night ; then pour off the juice, bring quickly to a boil, skim and add the plums ; cook very slowly till tender and clear, which will take about one-half hour ; take them out carefully and put into a pan ; boil the syrup for a few minutes longer until it thickens ; pour it over the fruit; seal or tie them up.'

A better plum for this part of Canada will probably be obtained by crossing the Nigra with the Americana, as it is possible that a variety may be originated which will have the tough tree of the Nigra and the thinner skinned fruit of that species with the productiveness and freedom from disease of the Americana and the quality of that species.

The trees at the Experimental Farm are ten feet apart in the rows, the rows being 20 feet apart ; this greater distance being required in order that the trees may be thoroughly sprayed. Ten feet is a little too close in the rows, as the trees are already.

interlacing, but this could not very well be avoided, as the original trees were planted 20 by 20 feet apart and the additional trees set half way between. A satisfactory distance would be about 15 feet apart each way, which would permit of thorough spraying for a long time. The trees, which are rather easily broken and split on account of the heavy crop they bear and the great growth they make when young, are better protected than if they were planted further apart.

In the report of the Horticulturist for 1900, a descriptive list was published of 13 of the best varieties of Nigra and Americana plums which had fruited at Ottawa, covering a season from August 24 to September 25. No new named varieties of special merit fruited this year, but among the young trees are a number of kinds which are spoken very highly of by those who have seen the fruit.

Seedling Plums.—Many seedling plums are being grown at the Experimental Farm, and a number of the Americana seedlings have already fruited. This year 54 trees bore, consisting of 12 Wolf, 7 Yosemite Purple, 6 Speer, 6 Weaver, 12 DeSoto, and 11 Rollingstone seedlings. Of these there were only three which were considered equal or superior to the best named varieties under test. These have been named and are herewith described :—

Don, *Wolf seedling.*—Planted in orchard, fall of 1895 ; tree hardy and vigorous ; fruit large, roundish ; suture a distinct line, not depressed ; colour uniformly deep, lively red all over ; dots numerous, small, yellow, distinct ; bloom moderately heavy ; flesh deep yellow, juicy, firm, with a sweet, rich flavour ; skin thick, and tough ; stone medium size, oval, somewhat flattened, cling ; quality, very good. Ripe September 28, 1901, and September 27, 1900. Thought to be the best late Americana plum yet fruited here.

Caro, *Wolf seedling.*—Planted in orchard fall of 1895 ; tree hardy and vigorous ; fruit very large, roundish ; suture fairly distinct, not depressed ; colour bright red, showing yellow in patches ; dots numerous, yellow, distinct ; bloom light ; flesh deep yellow, juicy, with a sweet, rich flavour ; skin thick, moderately tender ; stone large with an oval outline, but considerably flattened. Ripe September 6, 1901, and September 10, 1900. More attractive than Wolf and better in quality.

Bouncer, *Yosemite Purple seedling.*—Planted in orchard fall of 1895 ; tree hardy and vigorous ; fruit very large, roundish ; suture a distinct line, not depressed ; colour a uniformly deep purplish red all over ; dots numerous, yellow, distinct ; bloom moderately heavy ; flesh deep yellow, juicy, with a sweet, rich flavour ; skin thick and tough ; stone large, flat, cling ; quality very good. Ripe September 10, 1901, and September 22, 1900.

A promising seedling plum of the *domestica* group named Amaryllis (No. 219) was received from Mr. Aug. Dupuis, Village des Aulnais, P.Q. It was a medium sized yellow plum of very good quality.

CHERRIES.

The cherry crop was a failure this year, the flower buds having been killed by winter. There has not been a full crop of cherries here since 1898, so that although the stocks and wood are hardy, the winters, as a rule, appear too severe for the fruit buds. The wood of the Morello cherries wintered well, as usual, but the Bigarreau, which are tender here, were killed nearly to the ground. The Dukes were not quite so badly affected, although they were much injured. The trees made good growth this year.

GRAPES.

The grape vines were uncovered on May 8, and it was found that they had wintered well. There was a fine show of bloom at blossoming time and it was thought that the crop would be a heavy one, but the wet weather which set in was very un-

favourable for pollination, the result being that there was only about half a crop on most varieties. The season was favourable for the maturing of the fruit, and 115 varieties ripened, although some of them were late in doing so, as the weather was not warm enough for rapid ripening. The vines were thoroughly sprayed with Bordoaux mixture during the growing season, and there was little disease of any kind.

The system of pruning and training now adopted is thought to be one of the most satisfactory where grapes are grown for dessert purposes and for home use, where the vines have to be protected. The system is a modification of that known as the High Renewal.

When a young vine is planted in the spring it is cut back to near the ground and after making the season's growth it is again cut back to one stem about 18 inches from the ground. Two canes only are allowed to grow during the second season, and when long enough these should be tied to the lowest wire, which should be from 18 inches to 24 inches above the ground. In the autumn the canes are bent down and covered with soil to protect the vine during the winter, the main stem also being covered. In the spring the canes or arms are spread out in opposite directions and tied along the lower wire, and three new wires should now be added 18 inches apart. This year being the third, there will be canes grow upwards from the buds along the outstretched arms, and a little fruit may set. During the growing season, laterals or side shoots should be pinched out. In the autumn of the third year the canes which have grown upright should be cut back to near the arms, leaving only one bud on each, in addition to the bud at its base, on the arm. The arms should, at the same time, be cut back until there are from 40 to 50 buds left in all, from which fruiting wood will grow during the fourth year. In the High Renewal system, provision is made for the replacing of the arms every year by new ones, by leaving two additional stubs on the main stem from which new canes grow and which replace the two arms. In this system the arms are never more than one year old. The system adopted at the Experimental Farm is between this and the horizontal arm system, where the arms are left for a number of years. It is found that if the arms are left permanently they will get stiff and are difficult to bend down and cover with soil, and in the High Renewal system there is danger of breaking one year old canes, and also danger from winter killing, in either of which cases the crop would be lost. Better results can be obtained by having the arms at least two years old, but not more than four, and they may be renewed in alternate years. The amount of wood left on the vines must be regulated by the earliness, productiveness and vigour of the variety. In most cases, 40 to 50 buds are sufficient to leave ; as a medium crop of well-grown, well-ripened grapes is better than a large crop of inferior fruit. By having the crop as near the ground as possible without the fruit being injured by the soil, the grapes will ripen better than if higher up, on account of the reflection of heat from the ground. When the vines are in full bearing, as they are in the fourth year, considerable pruning is necessary during the growing season. The vines are uncovered as soon as there is no further danger of severe frost and before the buds have swollen, about May 7 being the average time. The arms are then tied to the lower wire. In about a month afterwards it will be necessary to go through and tie the young shoots to the second wire and to pinch out unnecessary shoots, such as suckers and laterals. In about a week more they should be tied again and the laterals and suckers removed. Another pruning is necessary after the vines have grown above the top wire, when they are pinched back to that wire, and any other unnecessary shoots pinched out as before.

In the report of the Horticulturist for 1900, a list was published of the twenty-five earliest varieties which had fruited here, with descriptions and notes as to quality and dates of ripening, as the early varieties are the most useful in the colder parts of Canada. New kinds are continually being tested, in order to find out whether there are any others which are as early, and also to test their quality and productiveness. A large number of varieties recently planted were originated by T. V. Munson, of Texas, from whom they were procured.

Varieties of grapes planted in 1900 and 1901.—Atoka, Campbell's Early, Colerraine, Delago, Delawba. Early Daisy, Hosford, Lucile, Lukfata, Lutie, McPike, Manito, Marvina, Mills No. 9, Nectar, Norfolk, Presly, Storr's Early, Wapanuka, Yomago.—20 varieties.

RASPBERRIES.

The season of 1901 was very unfavourable for raspberries in this district. Owing to severe weather the canes were badly winter-killed; the Cuthbert, which is the principal variety planted, being so much injured that there was practically no fruit of that variety. Golden Queen appeared to be the tenderest, as there was not a cane left of this variety. A seedling originated by Mr. R. B. Whyte, Ottawa, Ont., now called Herbert, was quite hardy and it yielded the best at the farm this year. At the Experimental Farm the canes were bent down as usual, but it appeared to have no beneficial effect. In the following table the yields for both 1900 and 1901 are given. The yields this year show the relative hardiness of the varieties rather than their productiveness, some kinds not producing any fruit, and others very little.

RASPBERRIES—TEST OF VARIETIES.

Name of Variety.	Date of First Ripe Fruit.		Date of First Picking.		Date of Last Picking.		No. of Pickings.		Total Yield.				Length of Row.
	1900.	1901.	1900.	1901.	1900.	1901.	1900	1901	1900.		1901.		
Red Varieties.									Lbs.	Oz.	Lbs.	Oz.	Ft.
Kenyon	July 14	July 9	July 16	July 12	Aug. 13	July 30	12	7	32	2	3	1	36
Henry	" 4	" 5	" 13	" 9	" 6	" 18	11	3	28	1	0	15	36
Brighton	" 7	" 5	" 13	" 9	" 9	" 22	10	5	27	2	4	13	36
Clarke	" 11	" 6	" 13	" 9	" 13	Aug. 2	13	9	26	15	5	11½	36
Count	" 7	" 5	" 13	" 9	" 9	July 22	12	5	26	13	5	3	36
Marlboro	" 9	" 6	" 13	" 9	" 13	" 30	13	7	24	9	6	6½	36
Muriel	" 8	" 6	" 13	" 9	" 9	" 22	11	4	22	10	0	12	36
Phoenix	" 9	" 13	" 16	" 15	" 17	Aug. 6	13	8	21	0	9	1½	36
Boyle	" 9	" 6	" 16	" 9	" 9	July 24	10	6	20	1	3	8	36
Red Antwerp	" 11	" 6	" 13	" 9	" 9	" 22	11	5	16	12	2	12¼	36
Turner	" 11	" 9	" 13	" 12	" 13	Aug. 2	13	7	16	7	3	14	36
Dora	" 11	" 6	" 13	" 9	" 13	" 6	12	8	15	14	5	5	36
Reliance	" 7	" 6	" 13	" 9	" 13	July 30	13	8	15	13	2	6	36
Cassel	" 12	" 10	" 18	" 12	" 13	" 27	9	6	15	2	2	7	36
Garfield	" 11	" 7	" 16	" 9	" 13	" 22	12	5	15	2	3	11½	36
Lorne	" 7	" 6	" 13	" 9	" 13	" 15	12	3	14	11	1	8	36
Cardwell	" 10	" 10	" 16	" 12	" 9	" 27	10	6	14	11	2	10½	36
Nelson	" 11	" 6	" 13	" 9	" 9	" 15	11	3	14	3	1	2	36
Trusty	" 6	" 6	" 13	" 9	" 13	Aug. 2	12	9	13	7	3	4	36
Alma	" 11	" 6	" 13	" 12	" 13	July 22	12	4	12	15	1	8½	36
Thompson's E'ly Prolific	" 9	" 10	" 13	" 12	" 13	" 30	13	3	12	10	0	4	36
Hornet	" 11	" 6	" 16	" 9	" 13	" 30	11	7	12	5	2	2½	36
Cardinal	" 12	" 9	" 20	" 12	" 13	Aug. 2	9	8	12	4	12	7	36
King	" 7	" 6	" 13	" 9	" 17	" 2	14	9	11	3	6	0½	36
Craig	" 12	" 6	" 16	" 9	" 13	July 22	12	5	10	11	1	14¾	36
Cuthbert	" 15	.....	" 20	.....	" 17	.....	11	....	10	11	.....		36
Loudon	" 12	July 12	" 16	July 12	" 17	July 30	13	7	10	10	2	6½	36
Hansell	" 6	" 6	" 13	" 9	" 13	" 22	13	5	10	9	1	2½	36
Heebner	" 12	.....	" 18	.....	" 13	.....	11	....	10	6	.....		36
Herstine	" 12	July 20	" 18	July 22	" 9	Aug. 2	8	3	8	7	0	7	36
Biggar's Seedling	" 13	" 9	" 18	" 12	" 13	July 30	11	7	8	5	3	7½	36
Fontenay	" 12	.....	" 16	.....	" 17	.....	11	....	7	5	.....		36
Miller's Seedling	" 9	July 16	" 13	July 18	" 13	July 22	13	2	7	1	0	4	36
Gladstone	" 7	.....	" 13	.....	" 27	.....	6	....	6	9	.....		36
Deacon	" 12	July 6	" 18	July 9	" 9	July 18	9	4	5	10	1	11	36
Herbert	" 12	" 9	" 18	" 12	" 1	Aug. 6	5	9	5	6	17	2	36
Sir John	" 7	.....	" 16	.....	" 6	.....	7	....	4	12	.....		36
Baumforth	" 9	July 5	" 13	July 9	" 6	Aug. 2	5	9	2	10	1	10½	36
Empire	" 6	" 6	" 13	" 9	July 18	July 15	3	3	2	9	0	6	36
Mary	" 16	" 6	" 18	" 9	" 25	" 15	4	3	2	5	0	12	36
Hiram	.....	" 10	.....	" 12	.....	Aug. 6	...	9	.....		4	13¼	36
Sarah	.....	" 20	.....	" 22	.....	" 6	....	6	....		2	10	36
Magnum Bonum	.....	" 6	.....	" 9	.....	July 24	....	5	.....		1	11	36
Knevett's	.....	" 6	.....	" 9	.....	" 12	....	2	.....		0	6	36

RASPBERRIES—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of First Ripe Fruit.		Date of First Picking.		Date of Last Picking.		No. of Pickings.		Total Yield.				Length of Row.
	1900.	1901.	1900.	1901.	1900.	1901.	1900	1901	1900.		1901.		
									Lbs.	Ozs.	Lbs.	Ozs.	Ft.
Yellow Varieties.													
Caroline	July 16	July 9	July 20	July 15	Aug. 16	Aug. 6	11	8	16	1	6	0	36
Yellow Antwerp	" 12	" 10	" 16	" 12	" 9	" 6	8	7	11	4	1	9½	36
Golden Queen	" 16	.....	" 23	.....	" 13	.....	9	....	8	1	..	..	36
Champlain	" 11	.....	" 16	.....	" 3	.....	8	....	4	14	.	....	36
Lady Anne	" 12	July 6	" 16	July 9	July 27	July 15	4	3	3	14	0	8	36
Purple Varieties.													
Shinn	July 12	July 9	July 13	July 9	Aug. 13	Aug. 6	13	10	27	8	16	12½	36
Duncan	" 14	" 10	" 18	" 12	" 13	" 6	10	8	18	15	4	13½	36
Shaffer	" 12	" 12	" 20	" 15	" 13	" 2	10	7	11	10	8	1	36
Ralph	" 16	" 16	" 20	" 18	" 9	July 22	8	2	8	7	0	4	36
Percy	" 10	" 9	" 16	" 12	" 6	Aug. 2	9	8	8	2	6	0½	36
Columbian	" 18	" 16	" 23	" 18	" 13	" 6	9	7	7	7	10	2½	36
RASPBERRIES GROWN IN LARGER PLOTS.													
Cuthbert (red)	.....	... ...	July 18	July 18	Aug. 16	Aug. 6	12	6	92	7	7	0	236
Sarah "	.....	.....	" 20	" 22	" 13	" 6	9	6	67	7	23	11	236
Heebner "	.....	.....	" 18	.....	" 16	.....	12	....	43	2	.....		236
Golden Queen (yellow)	.....	.....	" 20	.....	" 16	.....	11	....	45	8	.....		236
Progress (black cap)	.....	.....	" 14	July 9	" 13	July 22	11	5	84	5	33	13	236
Hilborn "	.....	.....	" 18	" 12	" 13	" 24	12	5	71	14	31	7	236
Older "	.....	.....	" 15	" 12	" 9	" 22	10	4	47	3	25	1	236
Shaffer (purple raspberry)	.....	.....	" 18	" 12	" 16	Aug. 2	12	8	72	12	72	7½	236

STRAWBERRIES.

The strawberries wintered well this year and the prospects for a heavy crop were good, but during the ripening season there was very hot, dry weather which reduced the yield, although the crop on the whole was good. The advantage of thick foliage was very apparent this year, as such thin foliaged varieties as Clyde, though promising a large crop, had their fruit badly scalded and withered up. While varieties with thick foliage did not suffer nearly so much.

There were 350 varieties in the plantation, but of these 167 had been marked to discard in 1900, and the yields of them are not given. A new plantation was made in the spring of this year containing 218 varieties for comparison of yields and quality. In addition to these, three plants each of those which had been discarded, were planted, in order to keep in touch with them. No fruit was allowed to ripen on the new plantation this year.

In the following table will be found the yields of those varieties not discarded in 1900 with the yields for 1900 and 1901, and the average yields for the two years. In addition to this, other useful data are given regarding the different kinds. The crop recorded is from two rows each 15 feet in length. The rows were planted 3½ feet apart and the plants 15 inches apart in the rows. In 1899, when the plantation was made, the runners were kept pinched off until July, and in the spring of 1900 each row was cut back to 2 feet in width where necessary, and in the spring of 1901 the rows were again cut back to 2 feet. It is interesting to note that some kinds yielded better the first year than the second, one reason being that the varieties which make many runners are crowded the second season. On the other hand, some kinds which make few runners the first year yield better the second season when there are

more of them. The character of the season would also influence the yield. On the whole, the best practice is to take only one crop off, letting the runners start in time to get a good stand the year the plantation is made.

The names of the varieties in the table are in descending order of merit according to the yield of 1901. By examining the table it will be found that the six best yielding varieties, taking the average of 1900 and 1901, are Mele, Daisy, Buster, Howard's No. 41, Glen Mary, and Afton, all of which were described in the report for 1900, except Mele, which is a pale, soft berry of only medium quality and not recommended. In the table the letter P. stands for pistillate, or imperfect flowers, and B. for bisexual, or perfect flowers.

Name.	Bi-sexual, Pistillate.	Date of full bloom.	Date of first ripe fruit.	Date of first picking.	Date of last picking.	Number of pickings.	Weight of 25 average berries.	Total yield, 1900.		Total yield, 1901.		Average yield, 1900 and 1901.	
							Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Greenville	P	May 29	June 22	June 24	July 9	5	6½	10	11	35	11½	23	3¼
Mele	P	" 28	" 19	" 20	" 7	6	5½	22	3½	34	5	28	4¼
Bisel	P	" 28	" 18	" 19	" 12	7	6¼	8	11¼	33	3½	20	15⅜
Sample	P	" 29	" 20	" 21	" 12	7	7½	.....		30	15		
Buster	P	" 29	" 22	" 25	" 9	5	8¼	20	8¾	30	12½	25	10⅝
Carrie	P	" 27	" 20	" 21	" 9	6	7½	5	9	29	15	17	12
Arkansas Traveller	B	" 28	" 18	" 20	" 7	6	5	9	10	29	10	19	10
Bubach	P	" 29	" 18	" 21	" 9	6	9¼	4	5	29	5¼	16	13⅛
Enhance	B	" 27	" 24	" 26	" 12	4	7	16	4	29	5	22	12½
World's Champion	B	" 28	" 22	" 24	" 8	5	5¼	7	2	29	2	18	2
Glen Mary	B	" 25	" 19	" 21	" 9	7	8	18	12	28	12¼	23	12⅛
Perfection	P	" 27	" 20	" 24	" 9	4	7½	11	4¼	28	5	19	12⅝
Lloyd's Favorite	P	" 28	" 19	" 20	" 8	6	7½	6	0	26	10	16	5
Dora	P	" 29	" 20	" 24	" 12	6	6¼	15	4½	26	9¼	20	14⅞
Vories	B	" 29	" 22	" 24	" 8	5	5½	1	9	26	8½	14	0¾
Williams	B	" 28	" 21	" 24	" 5	5	6	15	7	26	4	20	13½
Beder Wood	B	" 23	" 17	" 19	" 5	6	7¼	7	13	25	5	16	9
Cole's Seedling	B	" 29	" 22	" 26	" 12	5	6½	.....		25	0		
Howard's 41	P	" 27	" 18	" 21	" 9	6	6	25	2½	24	5½	24	12
Kyle	B	" 22	" 17	" 20	" 3	5	7	9	9	23	15½	16	12¼
Lincoln	P	" 25	" 15	" 17	" 8	7	6½	9	7¼	23	12	16	9⅝
Kansas Prolific	B	" 29	" 18	" 20	" 12	7	6	2	10½	23	11	13	2⅞
Barton's Eclipse	P	" 27	" 21	" 24	" 9	5	5¾	7	6½	23	10½	15	8½
Daniel Boone	P	" 29	" 18	" 21	" 9	7	6½	10	8	23	9½	17	0¾
Hood River		" 29	" 19	" 20	" 8	6	13½	4	9¼	23	9	14	1⅛
Dr. Arp	P	" 27	" 22	" 24	" 12	6	5⅜	9	9	23	8½	16	8⅝
G. H. Caughell	B	" 25	" 18	" 19	" 3	6	5¼	10	4¾	23	3½	16	12⅛
Tennessee Prolific	B	" 27	" 18	" 20	" 12	6	8	4	4½	23	2	13	11¼
Enormous	P	" 29	" 19	" 24	" 8	5	6¼	5	13	22	12½	14	4¾
Princess	P	" 27	" 18	" 19	" 9	7	8¼	3	9	22	11	13	2
Parker Earle	B	" 25	" 18	" 19	" 9	7	5¾	8	12½	22	10¾	15	11⅝
Sherman	B	" 25	" 18	" 19	" 9	8	9	6	12	22	7	14	9½
Maggie	P	" 23	" 18	" 22	" 3	4	5¾	19	8¼	22	3½	20	13⅞
Thompson's Late	P	" 29	" 24	" 25	" 9	5	4⅜	18	15½	22	2	20	8⅝
Wonderful	P	" 29	" 21	" 22	" 5	5	6¾	22	1½	21	13	21	15¼
Gen. Putman	P	" 25	" 18	" 24	" 9	4	6¾	8	2	21	12	14	15
Lovett	B	" 27	" 19	" 21	" 8	6	7	6	5½	21	9½	13	15½
Logan	B	" 27	" 22	" 24	" 9	5	6½	6	13½	21	3½	14	0⅛
Hatch Exp. Station	B	" 29	" 22	" 24	" 8	4	5½	1	14	21	2½	11	8¼
No Name	B	" 27	" 20	" 21	" 2	4	6	15	9⅜	21	1½	18	5⅜
Morgan's Favorite	B	" 27	" 22	" 24	" 9	5	8¼	4	11	21	1	12	14
Nick Ohmer	B	" 25	" 22	" 24	" 8	5	7½	4	12½	20	7	12	9¾
Cyclone	P	" 25	" 18	" 19	" 12	7	5⅛	9	4	20	7	14	13½
Mattie Warfield	P	" 27	" 21	" 22	" 5	5	7¼	22	5½	20	6	21	5⅝
Brandywine	B	" 27	" 22	" 25	" 12	6	6½	9	9½	20	1	14	13¼
Nehring's Gem	P	" 29	" 19	" 21	" 9	5	6	5	14⅜	19	15½	12	15⅜
Sadie	B	" 25	" 18	" 26	" 5	5	3½	4	5⅜	19	15	12	2⅜
Ridgeway	B	" 29	" 22	" 24	" 12	7	5⅜	3	0½	19	12	11	6¼
Cameronian	B	" 28	" 20	" 21	" 9	6	8¼	6	2¼	19	8½	12	13⅜
Manwell	B	" 29	" 22	" 24	" 3	4	5¼	1	7½	19	3½	10	5½
Cobden Queen	P	" 29	" 19	" 20	" 3	5	5⅛	7	2½	18	14	13	0¼
World's Champion	B	" 28	" 22	" 24	" 12	6	5¼	.....		18	9		
Daisy	P	" 25	" 18	" 22	" 8	5	7	33	2¼	18	6	25	12⅛

Name.	Bisexual Pistillate.	Date of full bloom.	Date of first ripe fruit.	Date of first picking.	Date of last picking.	Number of pickings.	Weight of 25 average berries.	Total yield, 1900.		Total yield, 1901.		Average yield, 1900 and 1901.	
							Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Anna Kennedy	P	May 29	June 17	June 19	July 5	6	5	7	10½	18	4	12	15¼
Anna Forest	P	" 25	" 18	" 20	" 3	4	7	5	7¾	17	15½	11	11⅜
Louis Gauthier	B	" 28	" 27	" 29	" 12	4	7½	4	11	17	15	11	5
Imp. Westbrook	P	" 25	" 18	" 20	" 3	5	5	2	11	17	11	10	3
Jucunda	B	" 29	" 22	" 24	" 5	5	8	4	7	17	10½	11	0¾
Wm. Belt	B	" 27	" 24	" 25	" 12	6	6½	1	12	17	10½	9	11¼
New Dominion	B	" 29	" 22	" 25	" 12	6	7¼	14	3¾	17	9½	15	14⅝
Stone's Early	P	" 25	" 17	" 19	" 5	6	4	19	4	17	6	18	5
Clyde	B	" 25	" 18	" 19	" 5	6	6½	10	8¾	17	3	13	13⅞
Phipen	B	" 28	" 22	" 24	" 8	5	4	.....		17	0	.....	
X 189	B	" 25	" 20	" 21	" 9	6	5½	7	1¾	16	14½	12	0⅛
Northern	B	" 23	" 15	" 17	" 5	7	5	11	11¼	16	12¾	14	4
Carleton	P	" 27	" 21	" 22	" 5	5	5¾	26	2	16	10½	21	6¼
Klickita	P	May 28	June 22	June 25	July 12	6	5¼	8	7½	16	4	12	5¾
Hattie Warfield	P	" 23	" 18	" 19	" 7	6	6½	15	9½	16	1	15	13¼
Sharpless Seedling	B	" 29	" 22	" 25	" 8	4	5½	.....		15	11½	.....	
Lloyd	P	" 28	" 19	" 20	" 8	6	6	2	4	15	11	8	15½
Young's Seedling	B	" 27	" 18	" 22	" 5	5	5¼	13	8½	15	10½	14	9½
Mayflower	B	" 22	" 14	" 17	June 26	4	4½	4	6	15	4½	9	13¾
Afton	P	" 25	" 18	" 22	July 8	5	6½	31	6	15	4	23	5
Deveroux	B	" 25	" 22	" 24	" 8	5	7	.....		15	3½	.....	
Sharpless	B	" 27	" 22	" 25	" 5	4	6½	5	10½	15	2	10	6¼
Starr	B	" 28	" 22	" 24	" 8	5	10½	4	11½	15	1	9	14¼
X 341	B	" 27	" 20	" 21	" 5	5	5½	6	15	14	15½	10	15¼
Hiawatha	B	" 28	" 22	" 24	" 8	5	6¾	4	1	14	15	9	8
Johnson's Early	B	" 23	" 17	" 20	" 8	6	6¼	3	8½	14	14	9	3½
Judsonia	B	" 29	" 18	" 19	" 7	6	4½	19	3¼	14	9⅜	16	14½
Champion of England	B	" 27	" 22	" 25	" 9	5	5½	9	11½	14	6⅜	12	1
Surprise	....	" 27	" 24	" 24	" 5	4	7	7	13½	14	4⅜	11	1⅜
Mrs. Cleveland	P	" 25	" 18	" 22	" 8	5	5½	10	14¼	14	0	12	7⅛
Howell's Seedling	B	" 29	" 22	" 24	" 8	5	5¼	.....		13	15	.....	
Scarlet Ball	P	" 29	" 24	" 26	" 12	5	6	5	5½	13	13½	9	9½
Winnie Warfield	P	" 27	" 24	" 25	" 8	4	7	7	7½	13	12¼	10	9⅞
Livingston	B	" 27	" 22	" 25	" 9	5	5¼	.....		13	12	.....	
Beverly	B	" 28	" 22	" 25	" 12	6	6	1	12½	13	10¼	7	11⅜
Little's No. 7	B	" 27	" 22	" 24	" 8	5	5	.....		13	10	.....	
Lady Rusk	P	" 25	" 18	" 21	" 12	6	7	11	1½	13	10	12	5¾
Ona	P	" 23	" 18	" 19	" 5	5	5	8	11½	13	9	11	2¼
Tubbs	B	" 25	" 18	" 19	" 3	5	6½	3	11½	13	2	8	6¾
Klondyke	B	" 29	" 24	" 26	" 8	4	5	3	15	13	1	8	8
Gandy	B	" 31	" 25	" 27	" 9	4	6¼	4	2½	13	0½	8	9½
Beede's No. 1	B	" 28	" 18	" 20	" 8	6	7½	1	8	12	15	7	3½
Sandoval	B	" 27	" 20	" 21	" 5	5	7½	8	9	12	15	10	12
Will Warfield	B	" 29	" 21	" 25	" 5	4	4½	11	14½	12	13½	12	6
Earliest	B	" 25	" 17	" 20	June 29	4	5½	1	10	12	13½	7	3¾
Crockett's	B	" 28	" 18	" 20	July 8	5	5	6	11½	12	11	9	11¼
Warfield	P	" 25	" 20	" 22	" 5	4	5¼	27	0½	12	10	20	0¼
Van Deman	B	" 25	" 14	" 17	" 5	7	4½	6	13½	12	9	9	11¼
X 119	B	" 27	" 19	" 21	" 9	6	7	.....		11	13½	.....	
Satisfaction	B	" 25	" 18	" 21	" 5	5	4¾	15	2	11	13	13	7½
Gandy Belle	B	" 27	" 20	" 21	" 5	5	6½	6	14½	11	13	9	5⅞
Kentucky	P	" 29	" 24	" 26	" 8	3	5½	2	2½	11	11	6	14¾
Marshall	B	" 23	" 18	" 19	" 12	7	9¼	4	7½	11	9¼	8	0½
Staples	B	" 23	" 15	" 17	" 3	6	5½	12	11¾	11	8½	12	2¼
Laxton's Noble	B	" 27	" 19	" 20	" 3	5	7½	.....		11	7	.....	
Elba	B	" 25	" 15	" 17	June 29	5	5	5	7½	11	6	8	6¾
Erie	P	" 29	" 24	" 26	July 8	3	5	.....		11	6	.....	
McKinley	B	" 28	" 22	" 24	" 3	4	6	2	7½	11	5½	6	14⅓
Crescent	P	" 27	" 18	" 19	" 5	6	4	9	14½	11	3	10	8¾
X 95	P	" 25	" 22	" 25	" 12	5	3	6	3½	10	12½	8	8
Steven's Early	P	" 27	" 18	" 22	" 3	4	6	28	5½	10	12	19	8¾
Swindle	P	" 25	" 20	" 24	" 9	3	5½	17	11¼	10	12	14	3½
Repeater	B	" 27	" 18	" 19	" 3	5	5¼	.....		10	11	.....	
John Little	P	" 25	" 18	" 19	" 3	7	4	15	11	10	11	13	3
Saunders	B	" 27	" 20	" 21	" 5	5	5	7	1½	10	9	8	13¼
Haverland	P	" 23	" 17	" 19	" 5	6	8	11	5¾	10	8½	10	15⅛
Harville	B	" 28	" 19	" 20	" 8	6	5	1	12	10	6½	6	1¼
Edgar Queen	P	" 27	" 17	" 19	" 5	6	5¼	5	11½	10	6	8	0¼

Name.	Bisexual Pistillate.	Date of full bloom.	Date of first ripe fruit.	Date of first picking.	Date of last picking.	Number of pickings.	Weight of 25 average berries.	Total yield, 1900.		Total yield, 1901.		Average yield, 1900 and 1901.	
							Oz	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Magoon	B	May 28	June 24	June 26	July 8	4	6	5	5	10	4	7	12½
Gladstone	B	" 28	" 22	" 24	" 5	4	7¼	2	11½	10	3	6	7¼
Excelsior	B	" 25	" 12	" 17	June 29	5	5	.....		10	1	.....	
King Worthy	B	" 28	" 22	" 24	July 8	5	5	.....		10	1	.....	
Bush Cluster	P	" 22	" 17	" 20	" 8	5	4½	10	1½	9	13½	9	15½
Snowball	B	" 25	" 18	" 19	" 5	5	7¾	7	7½	9	12¾	8	10⅝
Pennell	B	" 28	" 22	" 24	" 8	5	4	.....		9	12	.....	
Beauty	B	" 25	" 18	" 19	" 3	5	8	6	7½	9	9½	8	0½
Iowa Beauty	B	" 25	" 22	" 25	" 5	3	5	8	1	9	9	8	13
6 G	B	" 25	" 18	" 21	" 5	4	5⅜	10	14½	9	8½	10	3⅜
X 288	P	" 27	" 21	" 22	" 5	5	4¾	12	3½	9	8	10	13⅜
Michel's Early	B	" 22	" 12	" 17	June 28	5	3½	4	7¾	9	7½	6	15⅝
Senator Dunlap	B	" 27	" 18	" 22	" 2	4	6	.....		9	6	.....	
Twilight	B	" 23	" 20	" 22	" 8	5	5⅜	.....		9	3½	.....	
Bomba	P	" 28	" 18	" 20	June 26	3	6½	21	0¾	9	0	15	0⅜
Bouncer	B	" 27	" 20	" 20	July 3	4	8½	0	10½	8	15⅜	4	13½
Timbrell	P	" 29	" 24	" 26	" 12	5	6	1	15½	8	9½	5	4½
Homestead	B	" 27	" 18	" 20	" 8	5	6	1	7	8	7½	4	15¼
Edgar	B	" 28	" 22	" 24	" 3	3	5¼	10	8	8	6	9	7
H. & H	P	" 23	" 14	" 17	" 3	5	4	2	6½	8	5½	5	6
Berlin	P	" 25	" 18	" 21	" 3	4	6	6	11¾	8	4	7	7⅞
Della	B	" 27	" 22	" 24	" 8	4	5⅓	0	11	8	4	4	7½
X 77	P	" 29	" 24	" 25	" 9	5	3½	8	6½	8	1	8	3¾
Jersey Market	P	" 29	" 18	" 20	" 8	5	5½	.....		8	0	.....	
Leamington		" 27	" 21	" 22	" 5	5	6½	.....		7	15	.....	
Seaford	P	" 28	" 18	" 21	" 3	4	7	11	5½	7	14½	9	10
Eleanor	B	" 23	" 15	" 17	" 5	7	5½	4	4	7	13¾	6	0⅝
Maximus	B	" 27	" 24	" 26	" 5	3	6¼	1	14	7	13	4	13½
Osceola	B	" 22	" 14	" 17	" 3	6	3½	6	7¾	7	12¼	7	2
W. J. Bryan	B	" 23	" 20	" 22	" 8	5	6¼	.....		7	10½	.....	
Evans	B	" 29	" 18	" 20	" 3	5	5½	0	11	7	9	4	2
Greenville Seedling	B	" 27	" 18	" 19	" 5	5	5¼	8	9¼	7	6	7	15⅝
Hunn	P	" 29	" 30	July 2	" 12	4	7	1	12½	7	2	4	7¼
Banquet	B	" 27	" 18	June 21	" 3	4	7	7	13½	7	1	7	7¼
Cruse's No. 9	P	" 28	" 22	" 24	June 26	2	6½	10	0¾	7	1	8	8⅝
Rough Rider	B	" 29	" 22	" 24	July 3	4	5¼	.....		7	0½	.....	
Liddle	B	" 27	" 22	" 26	" 8	4	4½	.....		7	0	.....	
Boynton	P	" 25	" 17	" 19	June 25	3	5½	9	12	6	15	8	5½
Mrs. McDowell		" 29	" 22	" 25	July 9	5	7	.....		6	15	.....	
Jessie	B	" 23	" 18	" 19	" 8	6	5	2	1	6	11½	4	6¼
Little's No. 30	P	" 28	" 24	" 26	" 8	3	6	.....		6	8	.....	
Albert	B	" 31	" 27	July 3	" 12	3	6	.....		6	7	.....	
Darling	B	" 23	" 15	June 17	June 26	4	5½	2	6	6	6	4	6
Long Dark Seedling	B	" 27	" 21	" 22	July 2	4	6¼	9	3½	6	5½	7	12½
Early Canada	B	" 23	" 15	" 17	" 5	5	4	1	3½	6	4	3	11½
St. Joseph	B	" 23	" 6	" 19	" 2	5	3½	3	3½	5	14	4	8¾
White Alpine	B	" 27	" 22	" 27	" 5	2	1¾	2	2	5	9	3	13½
Noble	B	" 25	" 22	" 24	June 29	3	6½	8	6¼	5	8	6	15½
Hill's Manchester	B	" 23	" 22	" 25	July 8	4	4	8	11	5	7½	7	1¼
Orange County	P	" 23	" 15	" 17	June 28	5	4¾	6	8½	5	4	5	14¼
Bennett	P	" 27	" 21	" 22	July 3	4	6	.....		5	1½	.....	
Sam Sperry	B	" 29	" 24	" 25	" 5	4	6	15	14¾	5	1	10	7⅝
Avery Seedling	P	" 25	" 18	" 20	June 29	4	5¼	1	5½	4	10	2	15½
Emperor	B	" 25	" 20	" 21	" 26	3	6	.....		4	6	.....	
Woolverton	B	" 22	" 21	" 22	July 3	4	5	2	5½	4	3¼	3	4⅜
Oberholtzer No. 2	P	" 27	" 24	" 25	" 5	4	5½	6	5	3	4⅝	4	12⅝
Gardner	B	" 29	" 18	" 21	June 26	2	5	6	1½	3	2½	4	10
Cinda	B	" 29	" 22	" 24	July 3	4	4	0	14½	3	1	1	15⅜
Ethe May	B	" 23	" 18	" 20	June 26	3	5⅜	3	12½	3	6⅜	3	6⅜
Bismarck	B	" 27	" 17	" 20	" 29	4	4½	.....		2	15	.....	
Great American		" 29	" 27	" 29	July 8	3	4⅞	.....		2	15	.....	
Eureka	B	" 25	" 18	" 19	" 5	5	4½	.....		2	13½	.....	
Pride of Cumberland	B	" 28	" 24	" 26	" 3	3	5½	.....		2	12½	.....	
Philip's Seedling	B	" 29	" 24	" 26	June 26	1	6	9	14	2	10	6	4
Holland's Glory	B	" 28	" 22	" 25	July 5	4	1¼	0	5	2	2	1	3½
Augusta Narcaise	B	" 27	" 24	" 26	" 3	2	5	.....		1	15	.....	
Leader	B	" 23	" 18	" 22	June 28	3	6½	9	1	1	12	5	6½
Empress of India	B	" 29	" 25	" 27	July 9	4	5½	0	12½	1	10	1	3¼
Mytrott	B	" 27	" 18	" 20	June 29	4	.....	.....		0	12½	.....	

SPRAYING.

Spraying has long passed the experimental stage and it should not now be necessary to draw the attention of fruit growers to the importance of it. There are, however, a large number who do not spray. The proof of the value of spraying may now be had on every side, and it seems strange that good fruit is allowed to become worthless by disease when if sprayed in time it would be free, or almost free, from it. This year when the crop of apples was light and the prices high, it was especially desirable to keep what there was clean, and where this was done nearly as much money was realized in some cases as there would have been in a good fruit year, while on the other hand those who did not spray got very little.

A spraying calendar was published by the Entomologist and the Horticulturist this year, in which formulas are given for the various mixtures and solutions, what they are used for, and the time to apply them. This may be had on application. In a bulletin on Apple Culture, published this year also, further particulars were given on the subject of spraying.

The recent discoveries of Prof. T. J. Burrill, of the Illinois Agricultural Experiment Station, have necessitated a change in the time of the first spraying for the apple spot fungus. He found that the disease did not winter on the twigs as was supposed, but on the fallen leaves. Hence, the early spraying which it was customary to make with copper sulphate and water was really of little value in preventing the spread of the apple spot. It will, therefore, be advisable, to make the first spraying with the ordinary Bordeaux mixture and Paris green just as the leaf buds are breaking, regulating the time so as to kill the tent caterpillars which hatch about that time. The early sprayings are the most important, their object being to prevent the germination of the spores which alight on the leaves, fruit and other parts of the tree. Once the disease begins to spread it is very difficult to check it. Thorough spraying is just as important with other fruits as it is with the apple.

EXPERIMENTS WITH LIME MIXTURES FOR THE ERADICATION OF THE OYSTER-SHELL BARK-LOUSE.

Experiments were continued last winter with lime mixtures for the eradication of the oyster-shell bark-louse, in order to discover the best formula to use. As very severe weather occurred before the experiments were completed, and continued for some time, there were not as many mixtures used as had been planned, but the results obtained were very interesting. In the following table will be found a record of the work done and the results. The degrees of infestation, in ascending order, were : 'very few scales,' 'a few scales,' 'slightly infested,' 'moderately infested,' (meaning the same as 'considerably,' as used in 1900), and 'badly infested.' The spraying was done in November and December, 1900, and in January, 1901. Where possible the second application was made as soon as the first was dry.

Formula Used. — Number of Times Sprayed.	Number of Trees Sprayed.	How Infested before Spraying, December, 1900, and January, 1901.	How Infested after Spraying, December, 1901.
2 lbs. lime, 1 gallon water; sprayed twice.	32	24 moderately; 8 badly.....	26 with very few scales; 3 with few scales; 3 slightly affected.
Sprayed 3 times.....	1	Badly	Slightly; but few scales on young wood.
1 lb. lime, 1 gallon water; sprayed twice.	3	All moderately..	A few scales on one and very few on two.
Sprayed 3 times	4	" ..	Two slightly; two with but few scales.
1 lb. lime, 1 gallon water, $3\frac{1}{5}$ oz. salt; sprayed twice.	4	" ..	Very few left on any of the trees.

CONCLUSIONS REACHED UP TO DECEMBER, 1901.

1. Lime slaked in water and sprayed on apple trees infested with the oyster-shell bark-louse has the effect of loosening the scales.

2. The scales, when loosened, are removed from the trees by rain, ice, wind, and probably by other means.

3. As the scales contain the eggs from which the young insects hatch about June 1, it is necessary, in order to get the best results, that the trees be sprayed as soon as possible after the leaves fall in autumn, so that the loosened scales may be exposed to the weather for a long time before the eggs hatch.

4. The lime appears to have no injurious effect on the eggs within the scales.

5. Lime used in various proportions in the several experiments had no apparent injurious effects on apple or peach trees. Even when the leaf buds were opening no injury occurred.

6. As the action of the lime seems to occur soon after the trees are sprayed, it is not necessary to use any substance other than water to help bind it to the tree. On the contrary, it would appear that such substances counterbalance the effects of the lime, for a time, by glueing the scales to the trees.

7. It is important to use good stone lime, which has not been air-slaked.

8. The most economical and satisfactory formula so far has been found to be, 1 lb. lime, 1 gallon water, and 3½ oz. salt, or for a barrel of mixture, 40 lbs. lime, 40 gallons water, 8 lbs. salt. This should be sprayed on the tree twice, the second application being made as soon as the first is dry. The same proportions of lime and water without the salt have given quite satisfactory results also, and the salt is not necessary, but when used the bark of the trees was cleaner and brighter.

9. It is necessary to make at least two applications, as those scales with which the mixture does not come in contact will not be effected by it, and it is not possible to do the work thoroughly with one spraying.

10. The bark of trees sprayed with the lime mixture is much brighter afterwards than on trees not sprayed, and it is possible that many fungous germs are destroyed.

ASPARAGUS RUST.

The asparagus rust, *Puccinia asparagi*, D.C., is a disease which has done much injury to asparagus in the United States during the past five years, and more recently it has effected that vegetable in Canada. This year it appeared at the Central Experimental Farm for the first time. The disease was introduced from Europe to the United States and came into prominence about 1896. It has already spread from the New England States to Kansas and north into Canada. The following description of the life history of the disease is quoted from bulletin No. 188 of the New York Agricultural Experiment Station, where extensive experiments have been carried on in combating it.

'The life history of the fungus which causes the disease is marked by three distinct stages, each ending in the production of a crop of spores from which new plants may spring. This profusion of spore-forms may account in a measure for the rapid spread of the disease.

The first stage of growth of the fungus usually passes unnoticed by the owners of infested asparagus fields ; for from the germination of the spores in the spring till the first fruiting in June, the entire plant is hidden deep in the tissues of its host ; and this fruit-bearing is accompanied by no such change in colour of the asparagus fields as marks the ripening of the second crop of spores. In this first stage, known as the 'spring form,' 'cluster-cup stage,' or, scientifically classified, as the 'acidial stage,' the spores break through the epidermis of the host plant in clusters of cup-shaped pustules. These cups are greenish-yellow at first but change to orange-yellow as they mature.

The summer stage follows this spring form, though the two may overlap, both stages existing at the same time in the same plant. The brown colour of the asparagus fields produced by the ripening spores of this second stage, the 'red rust' form, and the rapid spread of the disease at this time, cannot fail to attract attention to the fields affected. The spores from this stage discharge from slits in the asparagus stems, not from clusters of pustules, and are so numerous that they cover workmen and tools in the fields with a heavy coating like brick dust.

The third stage, known as the 'winter stage,' follows the one just described, either in the fall or even in the summer if the lessened vitality of its host plant betokens approaching death. It is by the spores of this stage that the fungus is carried over the winter, so Nature provides for their formation whenever the existence of the fungus is threatened by the death of the asparagus plant it infests. The third stage differs from the second only in the character of the spores. In the summer stage the spores are one-celled and thin-walled, while in the winter stage they are two-celled, thick-walled and of such a dark brown colour that the stage is known as the 'black rust.' Both summer and winter spores may often be found in the same slit in the asparagus stem.'

The drying up of the stems and foliage of the asparagus plants before the season's growth is made, weakens them very much and on this account the crop of young shoots the following spring is much lessened and becomes still less every year the disease affects the plants. Owing to its smooth leaves and stem, asparagus cannot be sprayed to advantage with Bordeaux mixture, as it runs off when applied. At Geneva a combination was made of a 'resin-lime' mixture and Bordeaux mixture, the stock solution of the former being made as follows :—

Pulverized resin	5 lbs.
Concentrated lye	1 lb.
Fish oil or any cheap animal oil, except tallow	1 pint
Water	5 galls.

'It takes about two hours to prepare this mixture. The oil, resin and one gallon of hot water should be placed in an iron kettle and heated until the resin is softened, after which the solution of concentrated lye, or potash, should be carefully added, and the mixture thoroughly stirred. After the lye has been added, add four more gallons of hot water and allow the whole mass to boil until the mixture will unite with cold water, making a clear, amber-coloured liquid. When through boiling if there is not five gallons of the mixture add water enough to make that quantity.'

Two pounds of this stock solution were added to the Bordeaux mixture before spraying. The following quotation gives the dates of spraying and the results obtained :—

'After the last cutting was made the brush was allowed to grow for four weeks, after which five sprayings were given, the first on July 28. Alternate rows were sprayed and left as checks. The rust showed on the unsprayed rows August 19, and by August 24 had spread to all parts of these rows. They were killed by September 10. The sprayed rows remained green until the middle of October, but it was only the growth made between July 1 and August 10 that survived the attacks of the rust until October 15 ; that is, a growth that was completed, hardened and thoroughly sprayed before the rust struck the bed. All the new sprouts which came up in the sprayed rows after the rust appeared in the field were destroyed.'

'The results proved that in the case of every unsprayed row the yield in 1900 was less than it was in 1899, the decrease on the seven rows being 179 pounds. On the sprayed rows, on the contrary, there was an equally constant gain in yield of from 11 to 22 pounds to the row, the total increase being 110 pounds.'

The results obtained at the New York Experiment Station prove that the disease can be lessened materially by spraying, and as the loss to asparagus growers in Canada is likely to be very great from it, something should be done at once to check it,

and the best remedy found so far is that just described. If spraying is not done the plants should be cut and burned to help prevent the spread of the disease, but if this is done early the plants are weakened and if done late the spores will have spread, so that the best practice is to spray.

No variety has yet been found to entirely resist this disease, although Palmetto and Argenteuil appear to be the least affected. Conover's Colossal is one of the most injured by it.

LIST OF BEST VEGETABLES FOR FARMERS.

As all the experiments which are conducted with vegetables cannot be published every year on account of want of space, a list of the varieties of all the principal kinds which have proved the most satisfactory after several years' tests was published in the reports for 1899 and 1900 under the heading 'List of best Vegetables for Farmers.' This gave in a concise form much valuable information as to the best varieties to plant and must have proved very helpful to those who studied it. As the annual reports are very liable to be mislaid during the year, and as one is apt to forget the name of a variety, it has been thought advisable to again publish this list with what changes another year's experience warrants making.

Asparagus.—Conover's Colossal is the best all-round variety, but this variety is more subject to rust than Palmetto or Argenteuil.

Beans.—Golden Wax or Wardwell's Kidney Wax, for early crop ; Early Refugee, for medium ; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Asparagus (early) and Old Homestead are two of the best pole varieties.

Beets.—Egyptian Turnip, Eclipse and Bastian's Blood Turnip are three of the best varieties.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium) ; Late Flat Dutch, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage.

Cauliflowers.—Extra Early Dwarf Erfurt and Early Snowball (early) ; and Large Late Algiers are among the best.

Carrots.—Chantenay and Guerande or Oxheart are two of the best carrots, but if a good extra early sort is required, the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching, Paris Golden Yellow, Improved White Plume, White Walnut (early) ; London Red, Perfection Heartwell, White Triumph (late) are among the best.

Corn.—Early Cory, Crosby's Early, Henderson's Metropolitan (early) ; Perry's Hybrid, Stabler's Early, Early Evergreen, and Black Mexican (medium); Stowell's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably, and is of fine quality. Other promising sorts are Burbank's Early Maine, Early Fordhook (early) ; and Bonanza Sweet (late).

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Burnet Grape, Showing Method of Pruning and Training.

Sprayed. Potatoes at C. E. F., Ottawa. Unsprayed.
September 25th, 1961.

Egg Plants.—New York Improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, New York (curled), Tennis Ball, Salamander and Golden Queen (cabbage) ; Trianon and Paris Cos lettuce make a good list.

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type, and Surprise, Christiana and Emerald Gem, of the other types, are all good.

Melons, Water.—Cole's Early, Imperial, Ice Cream, and Phinney's Early are early water melons of excellent quality.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Double Curled is as good as any.

Peppers.—Cayenne, Cardinal, Chili and Golden Dawn are four of the best.

Pease.—Gregory's Surprise, Gradus, Nott's Eleelsior and Premium Gem (early) ; McLean's Advancer, Nott's New Perfection, Improved Stratagem and Heroine (medium). None of these are tall growing varieties. Juno (dwarf), Telephone, Startler (tall), (late). Excelsior is a promising second early sort.

Potatoes.—Extra Early : Early Ohio and Early Andes (pink), Bovee and Burpee's Extra Early (pink and white). Early : Everett and Rochester Rose (pink), Early Puritan (white). Medium : Carman No. 1 (white), Empire State (white). Late : Late Puritan (white), American Wonder (white), Rural Blush (pink).

Radishes.—Early : Rosy Gem, French Breakfast, Red Rocket (red) and Icicle (white). Late : White Strasburg, Long White Vienna. Winter : Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnæus and Victoria are the most satisfactory.

Salsify.—Long White is the best.

Spinach.—Victoria and Thick-leaved are the best.

Squash.—Early : White Bush Scalloped and Summer Crook Neck. Late : Hubbard.

Tomatoes.—Early : Sparks' Earliana, Canada Victor, Early Ruby and Dwarf Champion. Main Crop : Brinton's Best, Trophy, Matchless, and Baltimore Prize Taker.

There are many varieties of tomatoes which are almost equal in excellence and productiveness.

Turnips.—Early : Extra Early Milan and Red Top Strap Leaf. Swedes : Champion Purple Top, Skirving's Improved.

EXPERIMENTS WITH POTATOES.

The potato crop was light in the Ottawa Valley this year, owing to dry weather during the month of July, and to rot in the autumn. While the yields at the Experimental Farm are not as large as last year, they are good and there was little injury either from dry weather or from rot. The rot is seldom troublesome when the potatoes are planted in well drained, sandy loam soil, as they were here, and owing to thorough cultivation the crop was not reduced much by the dry weather.

There were 133 varieties tested in uniform plots this year, of which the Burnaby Mammoth produced the best crop, the yield being at the rate of 530 bushels 12 lbs. per acre. The poorest yield was 173 bushels 48 lbs. per acre, the difference in yield

between the best and poorest being 356 bushels 24 lbs. per acre, showing the great importance of planting the most productive varieties. The average yield per acre from all the varieties tested was 365 bushels 25 lbs., being 247 bushels 25 lbs. greater than the average for the province of Ontario for 1901, which was 118 bushels. This difference is greater, however, than it would be if the varieties had been grown by the acre instead of in small plots.

The potatoes were planted this year in the same sandy loam soil they occupied in 1900, as in the orchard inclosure this was the best place available for them. On April 22 and 23, however, the land was given a good dressing of well rotted manure, which was ploughed under on April 25. Just before planting time it was thoroughly incorporated with the soil by harrowing, twice with the disc harrow and once with the smoothing harrow. Drills were made 2½ feet apart and about 4 inches deep. The sets were of fairly uniform size and had at least three eyes with a good amount of flesh and were planted 1 foot apart. Each variety occupied one row 66 feet long. The sets were covered with the hand hoe to get as nearly uniform conditions as possible. The soil was harrowed once before the potatoes came up, to kill any weeds which had germinated, to level the ground, and to loosen the surface of it. The soil between the rows was kept cultivated until the vines met, but the latter were not hilled up. The vines were sprayed with Paris green to destroy the potato beetle, and 4 times with Bordeaux mixture to prevent blight and rot. The potatoes were planted on May 28 and dug on October 4.

POTATOES—Test of Varieties.

No.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Burnaby Mammoth	Good	530	12	490	36	39	36	Pink and white.
2	Dreer's Standard	"	506	0	457	36	48	24	White.
3	Late Puritan	"	503	48	440	0	63	48	"
4	Early White Prize	"	501	36	435	36	66	0	"
5	I.X.L	"	492	48	422	24	70	24	Pink and white.
6	Uncle Sam	Good	484	0	462	0	22	0	White.
7	Burnaby Seedling	"	479	36	418	0	61	36	Pink and white.
8	Canadian Beauty	"	479	36	400	24	79	12	"
9	Sabean's Elephant	"	473	0	415	48	57	12	White.
10	Green Mountain	"	470	48	422	24	48	24	"
11	White Elephant		464	12	420	12	44	0	Pink and white.
12	Seattle	Medium	462	0	415	48	46	12	White.
13	Vick's Extra Early	Good	462	0	391	36	70	24	Pink and white.
14	Money Maker	"	459	48	387	12	72	36	White.
15	American Wonder	"	455	24	418	0	37	24	"
16	Holborn Abundance	Medium	453	12	396	0	57	12	"
17	Pearce		446	36	413	36	33	0	Pink and white.
18	Burpee's Extra Early	Good	446	36	376	12	70	24	"
19	Clay Rose	Medium	444	24	418	0	26	24	Pink.
20	Maggie Murphy	"	440	0	409	12	30	48	Bright pink.
21	Livingston's Banner	Good	437	48	398	12	39	36	White.
22	Troy Seedling	Medium	435	36	396	0	39	36	"
23	Early Puritan	Good	435	36	380	36	55	0	"
24	Mills Prize	"	433	24	400	24	33	0	"
25	Rural Blush	"	433	24	389	24	44	0	Pink.
26	Jubilee	"	429	0	407	0	22	0	Pink and white.
27	Rochester Rose	"	422	24	354	12	68	12	Pink.
28	McIntyre	Medium	420	12	389	24	30	48	White and purple.
29	Churchill Seedling		420	12	385	0	35	12	White.
30	Cambridge Russet	Good	420	12	363	0	57	12	"
31	Polaris	"	418	0	369	36	48	24	"
32	Early St. George	"	418	0	360	48	57	12	Pink and white.
33	Carman No. 1	"	415	48	369	36	46	12	White.
34	State of Maine	"	413	36	385	0	28	36	"
35	Great Divide	"	411	24	360	48	50	36	"
36	Vigorosa		411	24	343	12	68	12	Pink and white.

POTATOES—Test of Varieties—*Continued.*

No.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
37	Early Norther	Good.	409	12	334	24	74	48	Pink.
38	Rawdon Rose	"	407	0	358	36	48	24	Pink and white.
39	Earliest of All	"	407	0	336	36	70	24	"
40	Enormous	"	402	36	380	36	22	0	White.
41	Vanier	Poor to medium	402	36	334	24	68	12	Red.
42	Dr. Maercher		402	36	297	0	105	36	White.
43	Quaker City		400	24	374	0	26	24	"
44	Brown's Rot Proof	Medium	398	12	347	36	50	36	Pink.
45	Early Harvest	Good	398	12	341	0	57	12	"
46	Irish Cobbler	"	396	0	365	12	30	48	White.
47	Burbank's Seedling	"	396	0	354	12	41	48	"
48	Early Sunrise	"	391	36	343	12	48	24	Pink.
49	Delaware	"	389	24	363	0	26	24	White.
50	Montana Bluff		389	24	356	24	33	0	White, bright pink eye.
51	Early Pride	Good.	389	24	336	36	52	48	Pink.
52	Wonder of the World	"	389	24	334	24	55	0	Pink and white.
53	Red Rock		389	24	323	24	66	0	Red.
54	Everett	Good	385	0	312	24	72	36	Pink.
55	General Gordon	"	382	48	312	24	70	24	"
56	Early Elkinah		380	36	336	36	44	0	"
57	Dublin Prize		380	36	327	48	52	48	
58	Peachblow		378	24	338	48	39	36	White.
59	Reeves' Rose		376	12	321	12	55	0	Pink.
60	Country Gentleman		374	0	319	0	55	0	Pink and white.
61	Rose of the North		371	48	305	48	66	0	Pink.
62	Lees' Favourite	Good.	369	36	321	12	48	24	"
63	New Queen	"	369	36	314	36	55	0	Pink and white.
64	American Giant	Medium	367	24	325	36	41	48	White.
65	Early Michigan		367	24	323	24	44	0	"
66	Sir Walter Raleigh		365	12	338	48	26	24	"
67	Seedling No. 7	Medium	365	12	334	24	30	48	Bright pink.
68	Flemish Beauty Seedling	Poor	365	12	319	0	46	12	"
69	Champion		360	48	294	48	66	0	White.
70	Seedling No. 230	Medium	360	48	314	36	46	12	"
71	Mammoth Pearl		356	24	314	36	41	48	"
72	Rural No. 2	Good.	354	12	332	12	22	0	"
73	Northern Spy	Poor.	354	12	290	24	63	48	Bright pink.
74	Napoleon	Good.	349	48	325	36	24	12	Pink.
75	Sharpe's Seedling	"	345	24	261	48	83	36	Pink and white.
76	Brosseau		343	12	316	48	26	24	Red and white.
77	Dakota Red	Medium	343	12	303	36	39	36	Red.
78	N. Bergeron		343	12	299	12	44	0	White, pink eye.
79	Dutch Blue		341	0	279	24	61	36	Dark purple.
80	Swiss Snowflake	Good	338	48	299	12	39	36	White.
81	Early Ohio	"	336	36	305	48	30	48	Pink.
82	Early Market		336	36	301	24	35	12	"
83	Irish Daisy	Good	336	36	292	36	44	0	White.
84	Pearce's Extra Early	"	336	36	286	0	50	36	Pink.
85	Early Rose	"	336	36	248	36	88	0	"
86	Bovee	"	334	24	281	36	52	48	Pink and white.
87	Early Summer		334	24	281	36	52	48	"
88	Early Andes	Good.	334	24	253	0	81	24	Pink.
89	Dobson's Early		332	12	268	24	63	48	White.
90	Thorburn	Good	327	48	275	0	52	48	Pink and white.
91	20th Century		327	48	253	0	74	48	White.
92	Bliss Triumph		325	36	299	12	26	24	Red.
93	Early Dawn		325	36	297	0	28	36	Pink, brighter at seed end.
94	Prize Taker	Good.	325	36	277	22	48	24	Pink.
95	Doherty's Seedling		323	24	299	12	24	12	White.
96	Livingston		323	24	294	48	28	56	White, pink eye.
97	Light Red Seedling		323	24	257	24	66	0	Pink.
98	Rose No. 9	Medium	321	12	290	24	30	48	"
99	Dark Red Seedling		321	12	286	0	35	12	Deep pink.

POTATOES—Test of Varieties—*Concluded.*

No.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
100	White Beauty	Good	319	0	281	36	37	24	White.
101	Rose of Erin		316	48	299	12	17	36	Pale pink, bright pink eye.
102	Chicago Market	Good	316	48	297	0	19	48	Pink.
103	Early Rose	"	316	48	228	48	88	0	"
104	Pearce's Prize Winner	"	314	36	246	24	68	12	"
105	Daisy	"	314	36	233	12	81	24	Pink and white.
106	Carman No. 3	"	312	24	294	48	17	36	White.
107	Columbus		310	12	270	36	39	36	Pink and white.
108	Ohio Junior		308	0	283	48	24	12	Pink.
109	Empire State	Good	308	0	281	36	26	24	White.
110	Silver Dollar		308	0	259	36	48	24	"
111	Penn. Manor		305	48	222	12	83	36	Pink and white.
112	Early Six Weeks	Good	303	36	286	0	17	36	Pink.
113	Gem of Aroostook	"	301	24	275	0	26	24	Pink and white.
114	Beauty of Hebron	Medium	294	48	250	48	44	0	"
115	Hale's Champion	Poor	294	24	248	36	41	48	White.
116	Pink Eye		290	24	246	24	44	0	White, bright pink eye.
117	Maule's Thoroughbred		290	24	242	0	48	24	Pink.
118	Reading Giant	Poor	286	0	244	12	41	48	"
119	Blue Potato		283	48	244	12	39	36	Deep purple.
120	White Giant		279	24	244	12	35	12	White.
121	Harvest King		275	0	248	36	26	24	"
122	Lizzie's Pride	Good	275	0	231	0	44	0	Pink, red eye.
123	New Variety No. 1	Poor	270	36	246	24	24	12	White.
124	Seedling No. 214	Good	264	0	228	48	35	12	"
125	Prolific Rose		264	0	226	36	37	24	Pink.
126	Bill Nye		253	0	162	48	90	12	White.
127	Seneca Queen	Very good	250	48	217	48	33	0	Pink and white, bright pink eye.
128	Clark's No. 1	Good	242	0	204	36	37	24	Pink.
129	Brownell's Winner	"	231	0	213	24	17	36	Red.
130	Houlton Rose		228	48	184	48	44	0	Pink.
131	Wall's Orange		226	36	204	36	22	0	Yellow, purple eye.
132	Up to Date		226	36	160	36	66	0	White.
133	Pride of the Market	Good	173	48	156	12	17	36	"

ADDITIONAL VARIETIES OF POTATOES TESTED IN 1901.

In addition to the varieties of potatoes grown in the uniform test plots, smaller quantities of the following varieties were planted :—

Name of Variety.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.		Colour.
		Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	
Northern Beauty	33	422	24	378	24	44	..	
Pingree	33	422	24	316	48	105	36	
Dooley	33	400	24	334	24	66	..	
Early Envoy	33	334	24	268	24	66	..	
Wonderful	33	325	36	268	24	57	12	
California Cup	33	268	24	198	..	70	24	
Eureka Extra Early	33	210	33	188	46	21	47	

TWELVE BEST YIELDING VARIETIES OF POTATOES—AVERAGE OF SEVEN YEARS' TESTS.

Name of Variety.	Average Yield per Acre.		Name of Variety.	Average Yield per Acre.	
	Bush.	lbs.		Bush.	lbs.
1. Holborn Abundance	424	51	7. Dreer's Standard	373	34
2. Seattle	422	59	8. Everett	373	2
3. American Wonder	418	8	9. State of Maine	369	50
4. Late Puritan	406	1	10. Polaris	368	59
5. Seedling No. 230	388	8	11. Vanier	368	30
6. Burnaby Seedling	381	48	12. Empire State	368	15

This table was taken from Bulletin 39 prepared by Dr. Wm. Saunders.

POTATOES—PLANTING AT DIFFERENT DISTANCES APART.

For the past six years an experiment has been tried in planting the sets at different distances apart in the rows, the rows in each case being 2½ feet apart. The best average results have been obtained, so far, by planting the sets 14 inches apart, though the results from planting 12 inches apart are nearly the same. The yields of unmarketable potatoes in this test did not vary much except where the sets were planted 8 inches apart, but in this case there was a somewhat larger proportion of unmarketable potatoes than in the others. For the first four years of this test only one variety was used, but during the last two years two were planted and their average yield given. This year the varieties planted were Everett and Uncle Sam, an early and a late variety. The amount of seed per acre used may appear large, but from experiments conducted here it has been found advisable to use large sets.

Distances apart of Sets.	Seed required per acre.		Yield per acre, 1896.		Yield per acre, 1897.		Yield per acre, 1898.		Yield per acre. 1899.		Yield per acre, 1900.		Yield per acre, 1901.		Average Yield per acre, 6 years.		Average Yield per acre, after deducting seed.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
10 inches apart.	34	50	345	18	331		268	24	392	2	327	48	393	48	344	43	309	53
12 " ..	29	2	336	36	278	47	347	36	406	34	316	48	385		345	13	316	11
14 " ..	24	53	323	24	268	50	290	24	454	58	325	36	398	12	343	34	318	41
16 " ..	21	46	335	30	226	1	233	12	392	3	279	24	429		315	52	294	6
18 " ..	19	21	289	18	226	31	253		234	34	270	36	369	36	273	56	254	35

POTATOES—PLANTING AT DIFFERENT DEPTHS.

An experiment has been conducted during the past four years in planting potatoes at different depths in rows 2½ feet apart and 12 inches apart in the rows. The sets had at least three eyes each, and were about uniform in size. The soil was sandy loam, every year. Level cultivation was adopted, and thus very little soil was thrown on the potatoes after they were covered at the time of planting. The following table shows that the best yields were obtained from planting the sets only 1 inch deep. As the relative yields from the different depths of planting have not been the same every year, it will be necessary to continue this test for some time before accurate conclu-

sions can be drawn. Notes were taken on the depths at which tubers were formed in 1899, 1900 and 1901, and it was found that most of them were within 4 inches of the surface of the soil, even where the sets had ben planted 6, 7 and 8 inches deep. Where the sets were planted less than 4 inches deep nearly all the tubers were formed between that and the surface of the soil. Two varieties, the Sir Walter Raleigh and Empire State, were used in the test this year, and the average results from them are given as the yields for 1901. There are several reasons why the potatoes planted from 1 to 3 inches deep should give the best results. Potatoes will develop more rapidly in warm soil than in that which is cooler. The soil within the first three or four inches of the surface is warmer than that three or four inches lower down, hence the conditions are more favourable for the potato. The tubers when the potato is in the wild state develop near the surface or on the surface of the ground. It seems natural, therefore, that the cultivated potato should be planted shallow.

On the other hand, much of the success of shallow planting will depend on the moisture of the soil. If the season is very dry the first two inches of soil may be so dry that the potato will not take root readily, and the season of growth will thus be shortened, but this has not happened here during the past four years. Once the roots begin to grow they speedily reach a depth where plenty of moisture is found.

From the results obtained it seems reasonable to conclude that where sandy loam soil is not dry the best results can be obtained from shallow planting. In any case, early planted potatoes will probably succeed best when planted shallow, as the ground will be warmer. In places where the spring is late or where the ground is cold, best results will probably be had by shallow planting.

Although the best results have been obtained in sandy loam soil by planting the sets one inch deep, this method is not recommended for field culture. Unless the surface of the soil is kept loose and free from weeds the potato crop will not be large. In order to kill a large proportion of the weeds which grow, the ground should be harrowed once or twice before the potatoes come up or just as they are coming up. If the sets were planted only one inch deep and the soil harrowed, many of them would be dragged out, hence about four inches deep would probably be the best.

Depth of Planting.	Yield per acre, 1898.		Yield per acre, 1899.		Yield per acre, 1900.		Yield per acre, 1901.		Average Yield per acre, 1898-1901.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
1 inch	347	36	532	24	468	36	371	48	430	6
2 inches	244	12	469	28	462	00	321	12	349	13
3 "	281	36	493	41	422	24	343	12	385	13
4 "	277	12	520	18	404	48	312	24	378	40
5 "	290	24	474	19	334	24	319	00	354	24
6 "	264	00	421	5	367	24	327	48	345	4
7 "	290	24	392	3	336	36	242	00	315	15
8 "	266	12	353	19	345	24	182	36	286	52

POTATOES PLANTED AT DIFFERENT DATES.

In 1898, an experiment was begun in planting potatoes at different dates, beginning when the main crop was put in and continuing at intervals of two weeks until August 23, 1898 ; July 23, 1899 ; July 21, 1900 ; and July 11, 1901. An early and a late variety were used each year, the varieties being Early Norther and Irish Daisy, in 1898 ; Early Norther and Rural Blush, in 1899 ; Early Norther and Sir Walter Raleigh, in 1900, and Early St. George and Rural No. 2, in 1901.

In 1898 and 1899 the decrease after the third planting was so great that it appeared as if a fair crop of marketable potatoes could not be produced when the seed was

planted much after June 24, but the results obtained in 1900 by planting on July 7 proved that it is possible to produce a good crop of potatoes after a crop of early vegetables, such as pease, has been removed. The fourth planting in 1901 was a little later than in previous years and the season not as favourable as in 1900.

Date of Planting.	Total Yield per acre, 1898.		Total Yield per acre, 1899.		Total Yield per acre, 1900.		Total Yield per acre, 1901.		Average Total Yield per acre, 1898–1901.		Average Yield per acre, Marketable, 1898–01		Average Yield per acre, Unmarketable, 1898–1901.	
Early Variety.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1st planting, May 26, 1898; May 26, 1899; May 26, 1900; May 30, 1901	277	12	505	47	409	12	374	00	391	33	337	55	53	38
2nd planting, June 10, 1898; June 9, 1899; June 9, 1900; June 13, 1901	160	36	459	48	453	12	299	12	343	12	276	25	67	47
3rd planting, June 24, 1898; June 23, 1899; June 23, 1900; June 27, 1901	125	24	237	10	365	12	246	24	243	32	196	1	47	31
4th planting, July 8, 1898; July 7, 1899; July 7, 1900; July 11, 1901	30	48	9	41	268	24	74	48	95	55	67	6	28	49
5th planting, July 23, 1898; July 21, 1899; July 21, 1900	1	6	.....		26	24								
6th planting, August 9, 1898	No yield													
7th " " 23, 1898														
Late Variety.														
Planted on same dates as the early variety—														
1st planting	259	36	338	48	277	12	501	36	344	18	296	7	48	11
2nd "	173	48	164	34	338	48	404	48	270	29	216	22	54	7
3rd "	68	12	157	18	198	00	325	36	187	16	158	9	29	7
4th "	8	48	19	22	202	24	57	12	71	56	40	42	31	14
5th "	1	6	.....		26	24								
6th "	No yield													
7th "														

POTATOES—RESULTS OF SPRAYING WITH BORDEAUX MIXTURE FOR THE PREVENTION OF BLIGHT AND ROT.

It is the usual practice to spray the experimental plots of potatoes at the Central Experimental Farm with Bordeaux mixture for the prevention of rot and blight, but owing to the nature of the soil in which they are planted, nearly always a light sandy loam, it is seldom that rot is troublesome. This year, however, 8 varieties were planted on May 30 in heavier and wetter soil, for the purpose of demonstrating the advantage of spraying. Of each variety there were four rows, 33 feet in length, sprayed, and the same area left unsprayed. The mixture was 6 lbs. of bluestone, 4 lbs. of lime, and 40 gallons of water. The first spraying was made on July 2, and the vines were kept covered with the mixture throughout the rest of the season.

Name of Variety.	Plants dead where sprayed.	Plants dead where unsprayed.	Total yield per acre, sound potatoes, sprayed.		Total yield per acre, sound potatoes, unsprayed.		Difference in yield per acre, sprayed and unsprayed.		Yield of rotten potatoes per acre, unsprayed.	
			Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
Swiss Snowflake	Oct. 4, not dead	Sept. 28	342	6	229	54	112	12	26	24
Burnaby Mammoth	Sept. 30	" 21	464	12	292	36	171	36	47	18
American Wonder	" 30	" 21	377	18	222	12	155	6	77	
General Gordon	" 30	" 19	313	30	270	36	42	54	19	48
Early Norther	Oct. 2	" 20	322	18	306	54	15	24	8	48
Rose No. 9	Sept. 30	" 21	497	12	376	12	121		2	12
Early Harvest	" 28	" 16	426	48	310	12	116	36	27	30
Lee's Favorite	" 30	" 16	272	48	246	24	26	24	20	54

There was a very light crop of potatoes this season owing to dry weather at a critical period in the growth of the plants, followed later on by blight and rot, and thus the results obtained by spraying with Bordeaux mixture show the great importance of this work. It will be observed that the sprayed plants grew from 6 to 14 days longer than the unsprayed, during which time the small potatoes were getting larger and the crop greater. There were no rotten potatoes in the sprayed lot.

EXPERIMENTS WITH TOMATOES.

After five years' test a large number of varieties of tomatoes were discontinued this year, but with the new kinds added there were 100 varieties still under test this season, but more will be discarded before planting next year.

The yields of the twenty-five best yielding varieties, only, are published, as space will not permit of giving a full table. In addition to this list, however, will be found the names of the six earliest varieties for this year, also the six wrinkled and twelve smooth kinds which have averaged the highest yields for six years. It will be noticed that the Canada Victor has been put in the table of wrinkled varieties this year, as the proportion of wrinkled tomatoes produced by it is greater than smooth.

The seed of the tomatoes grown this year was sown in hot-beds on April 6 ; the young plants were pricked out into strawberry boxes on April 29, and planted in the open ground on June 3. They were placed four feet apart each way, and five plants of each variety were used. The soil was a light sandy loam in which tomatoes had been grown the previous season. It was heavily manured for tobacco in 1899, but none was applied in 1900. Rye was sown in the autumn of 1900 and ploughed under on May 30, and the land prepared for tomatoes without any additional fertilizer. The soil was kept cultivated until the growth of the plants prevented it. The vines were not trained in any way, but were allowed to lie on the ground. This was a favourable season for tomatoes and there was little green fruit left on the vines when frost came. There was considerable rot this year, but notwithstanding that fact the crop of good tomatoes was large.

TOMATOES—TEST OF VARIETIES.

Name of Variety.	Date of first ripe fruit.	Yield of ripe fruit, first three pickings.	Yield of ripe fruit, balance of pickings.	Total yield of ripe fruit, all pickings.	Remarks.
		Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	
1 Baltimore Prize Taker	Aug. 14..	.....	127 15	127 15	Above medium size, smooth, purplish pink.
2 Child's Ruby Queen..	" 24..	.....	124 9	124 9	Large to very large, deep red, wrinkled.
3 King Humbert.....	" 9..	15	118 13	119 12	Below medium, wrinkled, scarlet.
4 Creekside Glory	" 19..	.....	118 2	118 2	Above medium, wrinkled, scarlet.
5 Extra Early Red.....	" 5..	1 1	116 14	117 15	Below medium, smooth, scarlet.
6 Extra Early Advance.	" 6..	6	113 5	113 11	Below medium, smooth, scarlet.
7 Turner's Hybrid.....	" 1..	13½	109 7	110 4½	Large, smooth to slightly wrinkled, purplish.
8 Early Bermuda.....	" 3..	9¾	107 13	108 6¾	Medium to above medium, wrinkled, scarlet.
9 Freedom	" 8..	6	107 4	107 10	Medium to below medium, smooth, scarlet.
10 Early Michigan.....	" 24..	.....	107 10	107 10	Medium, smooth, scarlet.
11 Maule's Earliest	" 12..	8½	105 3½	105 12	Medium to large, wrinkled, scarlet.
12 Burpee's Climax.....	" 14..	1 4½	103 4½	104 9	Medium, smooth, purplish pink.
13 Extra Early Purple Advance.....	" 6..	2	102 10	102 12	Medium to below medium, smooth, purplish pink.
14 Extra Early Jersey ..	" 5..	1 5½	101 00	102 5½	Medium to above medium, wrinkled, scarlet.
15 Acme.....	" 18..	.....	100 7	100 7	Medium, smooth, purplish pink.
16 Money Maker	" 3..	4¾	98 13	99 1¾	Medium to above medium, wrinkled, scarlet.
17 Long Keeper	" 15..	4	98 10	98 14	Medium, smooth, purplish pink.
18 Improved Trophy....	" 12..	6	98 00	98 6	Above medium to large, smooth, scarlet.
19 Essex Hybrid.....	" 19..	.... ..	96 12	96 12	Above medium, smooth, purplish pink.
20 Bright and Early	" 17..	... .	96 1	96 1	Below medium, smooth, scarlet.
21 Sutton's Eclipse.....	" 22..	.... . .	94 4	94 4	Medium, smooth, scarlet.
22 Liberty Bell.....	" 19..	....	92 12	92 12	Medium to above medium, smooth, scarlet.
23 Early Bird	" 3..	15	91 6	92 5	Below medium, smooth, purplish pink.
24 Conqueror	" 5..	6	91 14	92 4	Medium to large, wrinkled, scarlet.
25 Sparks' Earliana.....	July 27..	3 8¼	86 6	89 14½	Medium, smooth, scarlet.

TOMATOES—SIX EARLIEST VARIETIES.

Name of Variety.	Date of First Ripe Fruit.	Yield of Ripe Fruit, First Three Pickings.	Yield of Ripe Fruit, Balance of Pickings.	Total Yield of Ripe Fruit, All Pickings	Remarks.
		Lbs. Ozs.	Lbs. Ozs.	Lbs. Ozs.	
Sparks' Earliana ..	July 27....	3 8½	86 6	89 14½	Medium size, smooth, scarlet.
Earliest of All....	Aug. 3....	1 7¼	53 8	54 15¼	Above medium, wrinkled, scarlet.
Extra Early Jersey	" 5....	1 5½	101 0	102 5½	Medium to above, wrinkled, scarlet
Dominion Day....	" 1....	1 1¾	71 0	72 1¾	Above medium, wrinkled, scarlet.
Extra Early Red..	" 5....	1 1	116 14	117 15	Below medium, smooth, scarlet.
Essex Early South.	" 3....	0 15¼	74 6	75 5¼	Below medium, smooth, scarlet.

The first fruit of a few other varieties was ripe earlier than some of these, but the yield from the first three pickings was smaller. Sparks' Earliana was the best early tomato in 1901.

SIX BEST YIELDING WRINKLED VARIETIES—AVERAGE FOR SIX YEARS.

Name of Variety.	Average Date of First Ripe Fruit.	Average Yield per Acre.		Remarks.
		Lbs.	Ozs.	
Early Bermuda	Aug. 6	17	5	Medium to above medium, wrinkled, scarlet.
Money Maker	" 4	16	0	Medium to above, wrinkled, scarlet.
Extra Early Jersey	" 4	15	5	Medium to above, wrinkled, scarlet.
Canada Victor	" 4	15	5	Medium size, wrinkled to smooth, scarlet.
Early Richmond	" 5	14	8	Medium to above, wrinkled, scarlet.
Conqueror	" 2	14	0	Medium to large, wrinkled, scarlet.

TWELVE BEST YIELDING SMOOTH VARIETIES—AVERAGE FOR SIX YEARS.

Baltimore Prize Taker	Aug. 7	16	8	Medium to above medium, regular, smooth, purplish pink.
Extra Early Advance	" 4	15	4	Below medium size, smooth, scarlet.
Bond's Early Minnesota	" 1	15	0	Medium to below medium, smooth, purplish pink.
Essex Hybrid	" 8	14	10	Medium to above medium, regular, smooth, purplish pink.
Brinton's Best	" 13	14	9	Above medium to large, regular, smooth, scarlet.
Comrade	" 7	14	8	Medium to below medium, smooth, scarlet.
Early Ruby	July 31	14	7	Medium size, smooth to slightly wrinkled, scarlet.
Trophy	Aug. 13	13	15	Above medium to large, smooth, scarlet.
Mayflower	" 7	13	9	Medium to large, regular, smooth, scarlet.
Autocrat	" 11	13	7	Medium to above, smooth, purplish pink.
Atlantic Prize	" 5	12	14	Medium size, smooth to wrinkled, scarlet.
Matchless	" 12	12	11	Above medium size, regular, smooth, scarlet.

For shorter periods, the following varieties have averaged well :—Bright and Early (5 years), 16 lbs. 6 oz. ; Freedom (4 years), 14 lbs. 9 oz. ; Maule's Earliest (3 years), 14 lbs. 15 oz. ; Creekside Glory (3 years), 14 lbs. 4 oz. ; Early Bird (3 years), 14 lbs. 1 oz.

PEASE—EXPERIMENTS FOR COMPARISON OF YIELDS AND QUALITY.

For the past four years a large number of varieties of garden pease have been tested in the horticultural department and notes taken on their earliness, productiveness, and quality ; the length of vines being also ascertained. In 1900, twenty-seven varieties which were considered the most promising from the standpoint of yield and quality were grown on larger plots in order to learn which were the best. This experiment was continued this year and the average results for the two years are given in the following table.

Twelve hundred selected pease of each variety were sown in drills 100 feet long and 2½ feet apart on May 10. The pease germinated well and there was a good stand. As each variety became ready for use, the date was recorded and the yields of green pods from the several pickings also made.

PEASE—TEST OF VARIETIES.

Name of Variety.	Ready for Use, 1900.	Ready for Use, 1901.	Number of Pickings, 1900.	Number of Pickings, 1901.	Total Yield of Green Pods, 1900.	Total Yield of Green Pods, 1901.	Average Yield of Green Pods, 1900-1901.	Length of Vine, 1900.	Quality.
Early.					Qts.	Qts.	Qts.	Inches.	
Gregory's Surprise	June 29	July 1	3	3	20	31	25½	18 to 22	Very good.
Cleveland's First and Best	July 1	" 1	3	3	26	31	28½	20 " 22	Medium.
Alaska	" 2	.....	2	...	24	...	.....	24 " 28	"
Station	" 3	July 1	2	3	22	29	25½	18 " 21	Very good.
Premium Gem	" 4	" 5	3	4	36	34	35	24 " 28	"
Chelsea	" 4	" 8	4	3	31	30	30½	12 " 16	"
Nott's Excelsior	" 4	" 5	2	3	23	20	21½	12 " 15	"
Child's Morning Star	" 4	" 1	2	2	19	25	22	30 " 34	"
Exonian	" 4	" 4	2	3	20	29	24½	24 " 26	Good.
American Wonder	" 5	" 6	2	3	22	31	26½	15 " 20	Very good.
Second Early.									
Nott's New Perfection	" 9	" 10	3	4	33	33	33	22 " 26	Very good.
Gradus	" 9	" 6	2	4	29	29	29	28 " 32	"
English Wonder	" 9	" 10	3	4	26	31	28½	16 " 20	Good.
Medium.									
McLean's Little Gem	" 12	" 13	3	6	36	42	39	34 " 40	Very good.
McLean's Advancer	" 14	" 13	3	6	38	35	36½	30 " 34	"
Burpee's Quantity	" 17	" 12	2	3	47	38	42½	34 " 38	Good.
Heroine	.....	" 17	.....	3	.....	18			
Late.									
Dwarf Telephone	July 19	" 24	3	2	40	16	28	22 " 26	Very good.
Startler	" 19	" 17	2	4	41	32	36½	38 " 42	"
McLean's Prolific	" 21	" 20	2	4	62	24	43	36 " 40	Good.
Yorkshire Hero	" 21	" 17	2	4	36	27	31½	30 " 34	Very good.
New Victory	" 22	.....	2	....	52	.....	.....	38 " 42	Good.
Champion of England	" 23	July 19	2	4	60	39	49½	60 " 66	Very good.
Boston Wrinkled	" 23	" 17	2	4	54	45	49½	48 " 52	Good.
Eugenie	" 23	" 17	3	4	50	29	39½	48 " 54	"
Juno	" 23	" 21	2	3	44	18	31	30 " 34	"
Stratagem, Improved	" 24	" 17	1	3	36	14	25	28 " 32	Very good.
Veitch's Perfection	" 31	" 19	2	4	38	23	30½	60 " 66	Good.

EXPERIMENTS WITH CORN.

For the past three years a large number of varieties of garden corn have been tested. In the reports for 1899 and 1900 full lists were published of the varieties with notes regarding them. Owing to the lack of space, the results this year are given of only twenty-four kinds, these being the varieties which have given the best average yields for three years in the several classes into which the varieties were divided, namely, early, second early, medium, and late. The soil in which the corn was planted was a light sandy loam on which squash, melons, and tobacco had grown in 1900. It received a good dressing of barn-yard manure in the spring of 1901, and was then ploughed and thoroughly harrowed. The corn was planted on May 31 in hills three feet apart each way, the places having been previously marked by a corn planter. About six kernels were planted in a hill. After germination had taken place and danger from cut-worms was over, the number of plants in a hill was reduced to four. Twenty-four hills of each variety were planted, but twelve average hills of each were used for comparison. The corn was kept thoroughly cultivated

during the summer and when growth had ceased in the autumn it was cut and the ears removed and counted.

Name of Variety.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Fit for use, 1901.	Height, 1901.	Length of ears, 1899.	Length of ears, 1900.	Length of ears, 1901.	Average length of ears for 3 years.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Marketable ears from 12 hills, 1901.	Average number of marketable ears for 3 years.
Early Varieties.					Ft. in.	in.	in.	in.	in.				
Burbank's Early Maine	Sweet	Aug. 16	Aug. 14	.....	7 6	6	6½	8	6 3/8	59	54	77	63
Early Fordhook	"	" 17	" 10	Aug. 13	5 11	6	6	7	6⅓	52	52	79	61
Extra Early Cory	"	" 15	" 11	" 13	5 10	6½	5½	7	6 1/6	60	53	67	60
Lackey's Early Sweet	"	" 17	" 11	" 14	6 8	7	6	7½	6 5/6	56	48	68	57
Early Marblehead	"	" 15	" 12	" 13	5 11	7	6	7	6 5/6	52	48	59	53
Ford's Early	"	" 17	" 11	" 12	5 7	7	7	7½	7 1/6	49	52	55	52
Second Early.													
Crosby's Extra Early	"	" 23	" 27	" 24	7 0	6	6	7	6⅓	50	69	56	58
Low's Perfection	"	" 25	" 31	" 27	8 1	7½	8	7½	7 5/6	59	71	42	57
Kendall's Early Giant	"	" 21	" 22	" 24	7 4	7½	6½	7½	7 1/6	43	40	79	54
Early Giant Sweet	"	" 24	" 20	" 27	7 6	7½	6	8½	7 5/6	52	37	59	49
Shaker's Early	"	" 26	" 27	" 27	7 6	8	9	8	8⅓	50	50	42	47
Child's Honey Dew	"	" 25	" 29	" 24	7 0	7	7	8	7⅓	54	46	38	46
Intermediate.													
Black Mexican	"	" 28	Sept. 9	Aug. 29	7 2	7	6½	7½	7	71	67	57	65
Burlington Hybrid	"	" 28	" 7	Sept. 3	8 4	8	7½	8	7 5/6	53	64	60	59
Stablers' Early	"	" 29	Aug. 28	Aug. 27	7 6	8	8	7½	7 5/6	39	57	64	53
Roslyn Hybrid	"	Sept. 1	Sept. 10	" 27	8 2	8	8	8	8	38	62	46	49
Moor's Early Concord	"	Aug. 31	" 6	" 28	8 4	8	7½	7½	7 5/6	44	50	47	47
Zig Zag Evergreen	"	Sept. 2	" 15	Sept. 2	8 2	7	6½	7	6 5/6	35	40	65	47
Late Varieties.													
Bonanza Sweet	"	Sept. 4	Sept. 10	Aug. 26	7 2	7	8	7	7⅓	35	51	62	49
Country Gentleman	"	" 12	" 12	Sept. 4	8 0	7	7	6½	6 5/6	44	58	40	47
Shoe Peg	"	" 4	" 18	" 3	7 6	6	7	7	6 5/6	30	47	41	39
Columbus Market	"	" 4	" 16	" 2	8 10	10	8	10	9⅓	36	40	42	39
Mammoth Sweet	"	" 12	" 19	Aug. 30	9 4	6	8	9½	7⅔	14	45	42	34
Stowell's Evergreen	"	" 12	" 12	Sept. 3	9 0	7	7½	9	7 5/6	16	42	42	33

EXPERIMENTS WITH MUSK MELONS.

A large number of varieties of musk melons have been tested during the past three years, and notes were taken on their productiveness, quality and time of maturing. In 1901 there were 62 varieties under test, most of which ripened. The seed was sown in strawberry boxes on May 6 and the plants grown in a hot-bed until June 4, when they were planted in the open ground, the soil being a warm light sandy loam. The melons were put in hills eight by eight feet apart, which had been prepared by removing the soil and replacing it with two shovelfuls of short barn-yard manure on which were thrown back from four to five inches of the surface soil. When the hills were ready the strawberry boxes were broken without loosening the soil, and the plants were then carefully set. When established there were usually four plants to a hill. The soil was kept cultivated until the growth of the plants prevented it.

In the following table the names are given of the twenty-five varieties which have averaged the best crops in three years, with notes regarding them.

MUSK MELONS.

Name of Variety.	Date of First Ripe Melon, 1899.	Date of First Ripe Melon, 1900.	Date of First Ripe Melon, 1901.	Number of Ripe Melons, 1899.	Number of Ripe Melons, 1900.	Number of Ripe Melons, 1901.	Average No. of Ripe Melons for 3 Years.	Average Weight per Melon for 1901.		Size and Quality.
								Lbs.	oz.	
Netted Gem	Sept. 13.	Sept. 5.	Aug. 30.	8	45	88	47	1	1½	Small, green flesh, good quality.
Rocky Ford	Aug. 29.	" 10.	Sept. 4.	25	37	54	39	0	14¾	" "
Extra Early Prize	" 29.	" 3.	Aug. 24.	32	45	27	35	1	8	Small, green flesh, poor quality.
Earliest Ripe	Sept. 8.	" 8.	" 22.	23	37	46	35	1	6	Above medium, yellow flesh, medium quality.
Emerald Gem	" 2.	Aug. 29.	" 28.	14	39	37	30	1	12	Small, yellow flesh, very good quality.
The Captain	" 13.	Sept. 5.	" 30.	21	28	42	30	1	3	Small, green flesh, medium quality.
Earliest of All	" 19.	" 8.	" 24.	5	15	41	20	0	14	Small, green flesh, good quality.
Early Bristol	" 13.	" 18.	" 30.	1	30	26	19	2	0	Below medium size, green flesh, medium quality.
Early Green Nutmeg	" 8.	" 13.	Sept. 4.	6	8	39	18	2	10¼	Medium size, green flesh, very good quality.
White Japan	" 19.	" 10.	" 3.	11	6	36	18	2	7½	Below medium size, green flesh, very good quality.
Cosmopolitan	" 8.	" 8.	Aug. 28.	11	16	25	17	2	8	Medium size, green flesh, very good quality.
Golden Jenny	" 19.	" 17.	" 28.	7	5	40	17	1	2½	Small, green flesh, medium quality.
Long Yellow	Aug. 26.	" 8.	" 22.	9	2	37	16	4	11¾	Large, yellow flesh, poor quality.
Pine Apple	Sept. 13.	" 3.	" 31.	6	7	34	16	1	15¼	Small, green flesh, good quality.
Hackensack	" 19.	" 19.	" 24.	7	1	39	16	3	0	Medium size, green flesh, good quality.
Early Burlington	" 23.	" 10.	" 31.	10	16	21	16	1	9½	Below medium size, green flesh, good quality.
Princess	" 19.	" 18.	" 31.	4	15	27	15	3	1	Medium size, green flesh, good quality.
Banana	" 23.	" 25.	Sept. 7.	5	12	27	15	4	10¾	Medium size, yellow flesh, good quality.
Improved Cantalompe	" 2.	" 18.	Aug. 26.	7	4	28	13	5	0¾	Above medium size, deep yellow flesh, poor quality.
Early Cassaba	" 8.	" 18.	Sept. 4.	13	2	25	13	2	11	Below medium size, green flesh, good quality.
Missouri	" 29.	" 10.	" 7.	1	15	24	13	1	15½	Below medium size, green flesh, good quality.
Christiana	" 13.	" 8.	Aug. 31.	5	6	26	12	2	3½	Below medium size, yellow flesh, very good quality.
Bay View	" 25.	" 17.	Sept. 4.	5	4	23	11	4	0½	Below medium size, green flesh, medium quality.
Surprise	" 19.	" 17.	" 4.	3	2	29	11	4	1¼	Medium size, yellow flesh, very good quality.
New Triumph	" 29.	" 4.	Aug. 26.	1	3	30	11	3	12½	Above medium size, deep yellow flesh, good quality.

It will be noticed that the Montreal Market, one of the best commercial melons, does not appear in this list, the reason being that it is a comparatively late variety and needs to be forced under glass for a time after planting.

EXPERIMENTS WITH TOBACCO.

There were 46 varieties of tobacco tested this year, and nearly all of these matured, as the season was very favourable for the growth of this plant. The seed was

sown in a hot-bed on April 11, and the young plants transplanted to a cold frame on May 17, and planted in the field on June 12. The soil was a sandy loam, which received a good dressing of partially rotted manure in the spring, which was ploughed under and the ground thoroughly harrowed and marked. The plants were then set 3 x 3½ feet apart, after which the soil was kept thoroughly cultivated until there was danger of the leaves being injured. The tops and suckers were removed at the proper time. In this test 15 average plants were selected from the 20 planted and the yield is estimated from them. Naturally the yield per acre is greater than if the plots had been larger. The tobacco was cut on September 8 and taken to the curing house, and when cured the leaves were stripped and weighed.

In the following table the average results are given for 1898, 1900 and 1901. There was a little more moisture than there should have been when the tobacco was weighed in 1899 and the yields for that year are not included.

Name of Variety.	Date of Topping, 1901.	Total Yield per acre, 1901.		Total Yield per acre, 1900.		Total Yield per acre, 1898.		Average Total Yield for 3 years.	
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Maryland	Aug. 1	2,937	13	2,350	7	1,844	14	2,377	11
Pennsylvania Seed Leaf	July 30	2,886	1	2,073	13	1,391	8	2,117	2
Brazilian American	" 24	2,419	6	1,831	14	1,557	14	1,936	6
Safrano	" 29	2,765	1	1,399	14	1,588	2	1,917	11
Connecticut Seed Leaf	" 29	2,713	14	1,417	2	1,427	6	1,852	13
Tennessee Red	" 29	2,160	3	1,555	5	1,633	8	1,783	0
East Hartford	Aug. 1	2,004	11	1,563	9	1,557	14	1,688	11
Virginia Oak Hill Yellow	July 27	2,143	1	1,624	7	1,285	10	1,684	6
Kentucky Burley	" 27	2,039	4	1,157	15	1,746	15	1,648	1
Climax	Aug. 1	2,142	15	1,382	12	1,391	8	1,639	1
Tuckahoe	July 27	1,952	13	1,572	11	1,187	5	1,570	15
Sterling	" 27	1,883	11	1,589	14	1,209	3	1,560	15
Hyco	" 27	1,572	10	1,486	4	1,603	4	1,554	1
Gold Leaf	" 29	1,468	15	1,780	0	1,393	10	1,547	8
Virginia One Sucker	" 24	1,866	7	1,261	9	1,391	8	1,506	8
Havana	" 24	2,333	0	1,313	6	850	4	1,498	14
Oronoka Yellow	Aug. 1	1,469	0	1,382	8	1,641	1	1,497	8
Sumatra	July 29	1,987	6	967	13	1,534	9	1,496	9
Pryor Yellow	" 24	1,676	5	1,244	5	1,536	9	1,485	12
Zimmer's Spanish	" 22	1,659	1	1,486	4	1,202	7	1,449	4
Granville Co. Yellow	" 29	1,123	5	1,382	9	1,755	13	1,420	9
Oronoka White Stem	" 24	1,313	7	1,382	9	1,504	15	1,400	5
Hester	" 24	1,572	10	1,123	5	1,421	12	1,372	9
White Stem	Aug. 1	1,071	8	1,192	7	1,614	8	1,292	13
Honduras	July 29	1,071	7	1,296	2	1,232	11	1,200	1
Primus	" 30	1,192	8	1,175	3	1,164	10	1,177	7
Cuban Seed Leaf	" 22	1,140	9	1,192	8	1,020	15	1,118	0
Persian Rose	" 22	1,175	4	1,071	7	710	14	985	14
Florida	" 10	725	15	829	8	748	11	768	1
Canelle	" 8	380	4	397	8	455	7	411	1
White Burley				1,330	11	1,323	7		
Comstock Spanish	July 22	2,298	8	1,348	1				
Turkish Aromatic	" 29	1,883	12	1,382	8				
Lancaster Co. Broad Leaf	Aug. 5	1,572	10	1,114	10				
Kentucky Yellow	July 27	1,555	6	1,192	7				
Latakia	" 29	1,555	5	846	12				
Improved White Burley	Aug. 1	1,468	14	1,935	9				
Goach	July 29	1,434	7	1,399	15				
Long Leaf Goach	" 29	1,399	13	1,572	10				
General Grant	" 29	1,382	9	1,382	8				
Famous	Aug. 1	1,351	1	1,088	12				
Big Oronoka	July 29	1,244	5	1,330	10				
Pryor Blue	" 27	1,244	4	1,399	13				
Bonanza	Aug. 1	1,157	14	1,520	13				
Persian Muscatelle	July 16	1,019	11	1,175	2				
Harby	" 10	794	15	1,123	5				
Small Red Canadian	" 4	397	9	881	9				

Larger areas were planted with six varieties and the results are given in the following table :—

Name of Variety.	Number of Plants.	Total Yield per acre, dry leaves.	Condition when cut.
	Lbs.	Lbs.	
Connecticut Seed Leaf	550	2,192	Ripe.
Zimmers Spanish	555	1,557	"
Improved White Burley	477	1,546	"
Pennsylvania Seed Leaf	551	1,447	"
Small Havana	541	1,363	"
Little Oronoka	613	1,188	"

FOREST BELTS.

The forest belts at the Central Experimental Farm extend along its northern and western boundaries ; the belt on the western boundary is 165 feet wide, and that on the northern boundary 65 feet ; their total length being nearly $1\frac{3}{4}$ miles. The number of trees growing in these belts, including those in an evergreen clump, is about 23,300.

The forest belts were planted for several objects, one of the principal being to gain information regarding the growth of the best timber trees, when grown on different kinds of soil and at different distances apart. The distances chosen at first were 5 by 5 feet, 5 by 10 feet, and 10 by 10 feet apart. The planting was also done to learn how the growth of trees planted in blocks of single species compared with that of trees grown in mixed plantations. Another object was to learn what influence the forest belts would have on the crops in the adjoining fields as regards the shelter afforded by them. The planting was also done with a view to the improvement of the landscape, and the various species were arranged so that a good effect would be produced. In addition to all this, it was intended that as much other data as possible should be gathered and that the forest belts would prove object lessons to those who were interested in tree growth.

It is now thirteen years since the first trees were planted in the belts referrd to, and the growth already made is a useful object lesson and should encourage the more extensive planting of timber trees. The soil in which the trees were planted was in many instances poor, and while a number of species appear to succeed almost as well on poor as on good land, yet some kinds require good soil in order to grow successfully. As to the distance apart at which it is desirable that trees should be planted, those which were put 5 by 5 feet apart are making, in most cases, the best trees for timber purposes, as the lower limbs are dying, leaving the trunks clean, which will make the wood freer from knots than where planted 10 by 10, or 10 by 5 feet apart, as at those distances there are, as yet, few instances where the lower limbs have died. The trees planted 5 by 5 feet apart, also, are a little taller as a rule than where wider planting was adopted, but the diameter of the trunk is not so great. The closely planted trees are more protected from storms and there are fewer broken tops and crooked stems. The desirability of close planting was also very apparent until quite recently in the condition of the surface of the ground where the trees are ten feet apart, which, in a number of cases, still required cultivation ; as it was necessary,

in order to keep the sod from forming and checking the growth of the trees, to cultivate the soil, whereas, in most instances, where the trees are planted 5 by 5 feet apart, the surface soil was kept shaded and moist, and sod did not form. As the conditions of soil are different in the belts where the trees are planted in clumps of a single species and where the several kinds are mixed together, a fair comparison of these two methods of planting cannot yet be made, but the advantages derived from mixing the leafier sorts of trees with those which are not very leafy, are already apparent. Where thin foliaged trees had been planted 5 by 5 feet apart and had had eight years' growth, the sod still formed very readily unless the soil was kept cultivated, thus showing that sufficient shade was not afforded to prevent the growth of grass and weeds. In 1899 some plantations were begun with trees and shrubs set 2½ feet apart each way in order to get the ground shaded soon. Most of these have made good growth, and the experiment promises to be very interesting, as different kinds of trees and shrubs were used for undergrowth. These plantations were cultivated this year and in 1900.

In the annual reports for 1897 and 1899, tables were published in which were given the measurements of trees in the forest belts at the Central Experimental Farm. A table is again published this year in which will be found the height and diameter of the trees up to the autumn of the present year.

Growth of Trees in the Forest Belts at the Central Experimental Farm.

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average Height, 1900.	Average Height, 1901.	Average Diameter 4' 6" from ground, 1901.
			Feet.	Years.	ft. in.	ft. in.	
Black Walnut—Juglans nigra	Low sandy loam	1888	5× 5	1	11 6	12 .	1¼
" "	"	1888	10×10	1	7 ..	7 11	1
" "	Sandy loam with small stones	1889	5× 5	2	16 4	17 7	2½
" "	" "	1889	10×10	2	12 3	13 4	2½
" "	Clay loam	1888	10× 5	1	14 1	15 4	2½
Butternut—Juglans cinerea	Low sandy loam	1889	5× 5	1	11 7	11 11	1½
" "	"	1888	10×10	1	10 1	10 6	1½
Silver-leaved Maple—Acer dasycarpum	Light sandy loam	1889	5× 5	3	27 3	28 ..	2½
" "	"	1889	10×10	3	24 8	25 1	4
European White Birch—Betula alba	"	1889	5× 5	3	34 8	35 9	3½
" "	"	1889	10×10	3	37 3	38 7	6
Canoe Birch—Betula papyrifera	"	1889	5× 5	3	31 ..	32 7	3½
" "	"	1889	10×10	3	31 1	32 8	5
Yellow Birch—Betula lutea	"	1889	5× 5	3	21 10	23 ..	2½
" "	"	1889	10×10	3	21 8	23 6	3½
White Elm—Ulmus americana	Sandy loam	1889	5× 5	3	17 3	18 1	2½
" "	"	1889	10×10	3	18 9	19 8	3½
Black Ash—Fraxinus sambucifolia	Black muck	1889	5× 5	2	18 2	18 10	2½
" "	Low sandy loam	1889	10×10	2	11 11	12 5	1½
Green Ash—Fraxinus viridis	Black muck	1889	5× 5	3	20 10	22 8	2½
" "	Low sandy loam	1889	10×10	3	17 2	18 5	3½
Red Ash—Fraxinus pubescens	Black muck	1889	5× 5	2	22 8	24 4	2½
" "	Light sandy loam	1889	10×10	2	17 2	18 10	2½
White Ash—Fraxinus americana	Black muck	1889	5× 5	3	24 1	24 8	2½
" "	Light sandy loam	1889	10×10	3	23 10	25 9	3½
Black Cherry—Prunus serotina	Light sandy loam and gravel	1889	5× 5	3	18 11	19 11	2½
" "	" "	1889	10×10	3	24 4	26 7	4
Box Elder—Acer Negundo	Light sandy loam	1889	5× 5	2	25 2	26 4	3⅜
				in.			
Scotch Pine—Pinus sylvestris	Sandy loam with gravel	1888	5× 5	18	23 6	24 9	3½
" "	" "	1888	10×10	18	21 2	22 7	4⅜
" "	Low sandy loam with gravel	1888	5× 5	18	22 9	24 2	3 1/16
" "	Low sandy loam	1888	10×10	18	21 10	23 ..	4⅜
" "	Light sandy loam	1888	10× 5	18	24 5	25 9	6⅞
" "	Clay loam	1888	10× 5	18	20 9	22 2	5⅜
" "	Light sandy loam and gravel	1888	10× 5	18	23 5	25 2	5⅝
" "	" "	1887	3× 3	9	24 4	26 ..	3¼

GROWTH of Trees in the Forest Belts at the Central Experimental Farm—*Concluded.*

Name of Species.	Character of Soil.	When Planted.	Distance Apart.	Age or Height when Planted.	Average Height, 1900.	Average Height, 1901.	Average Diameter 4′ 6″ from ground, 1901.
			Feet.	in.	ft. in.	ft. in.	
Austrian Pine—Pinus austriaca	Light sandy loam	1889	5× 5	18	17 10	19 9	4¼
" "	"	1889	10×10	18	18 1	19 9	5¼
" "	"	1888	10× 5	15	17 5	19 7	4
" "	Clay loam	1888	10× 5	15	17 ..	18 11	4¼
" "	Light sandy loam and gravel	1888	10× 5	15	19 6	21 6	5
" "	" "	1887	3× 3	15	18 ..	19 8	3¼
White Spruce—Picea alba	Light sandy loam	1889	5× 5	15	13 2	14 2	2¼
" "	"	1889	10×10	15	14 ..	14 10	2¼
Norway Spruce—Picea excelsa	"	1889	5× 5	18	15 11	17 2	3
" "	"	1889	10×10	18	20 1	22 ..	3¼
" "	"	1888	10× 5	15	23 4	25 7	3¾
" "	Clay loam	1888	10× 5	15	23 11	25 11	4
American Arbor-vitæ—Thuya occidentalis	Low sandy loam and black muck	1889	5× 5	18	15 ..	16 5	2¼
" "	Low sandy loam	1889	10×10	18	13 9	14 10	2 5/16
				feet.			
European Larch—Larix europæa	"	1888	5× 5	2	26 10	28 ..	3¼
" "	"	1888	10×10	2	27 6	28 5	4
White Pine—Pinus Strobus	Light sandy loam with gravel	1889	5× 5	8 to 10 in.	22 9	24 6	3¼
" "	" "	1889	10×10	8 to 10 in.	21 ..	22 7	5 3/4

The trees in the above table which have not made satisfactory growth owing to unsuitability of soil and other causes are Black Walnut, Butternut, White Elm, and Norway Spruce. Under better conditions these trees would have made much more growth.

During the autumn of 1901 the following additions were made to the trees in the forest belt along the western boundary. These were planted to replace other kinds which had not succeeded. The trees and shrubs were planted 2½ feet apart each way, the object being to get the ground shaded as soon as possible, in order that weeds would be killed, moisture conserved and the soil kept from baking without having to cultivate. There was also the important object of making the permanent trees shoot up straight without side branches. Necessarily, the great majority of the trees and shrubs planted were for this purpose.

Name.	Number Planted.	Height when planted.
White Ash (*Fraxinus americana*)	275	4 feet.
Tamarac (*Larix americana*)	413	3 "
White Spruce (*Picea alba*)	105	2 "
Box Elder (*Acer negundo*)	300	2-year-old tree cut back to ground.
Alder Buckthorn (*Rhamnus Frangula*)	879	6 inches.
Ninebark (*Neillia opulifolia*)	203	2-year-old shrubs cut back to ground.
Rosemary Willow (*Salix rosmarinifolia*)	1,483	Unrooted cuttings.
Total	3,658	

In addition to these there were Black Walnut, White Pine, Hard Maple, Rosemary Willow, Sand Cherry, and White Ash used to complete the plantations begun in 1899.

ARBORETUM AND BOTANIC GARDEN.

Comparatively little is known of the Arboretum and Botanic Garden at the Central Experimental Farm, except by those who have visited Ottawa and seen it. When the farm was purchased, in 1886, sixty-five acres were selected for that purpose, and planting was begun in the autumn of 1889. Most of the land is high, and a fine view is obtained of the city of Ottawa on the north and east, while to the south there is a pleasing view across country with glimpses of the Rideau river in the distance. The Arboretum is bounded on one side by the Rideau canal, which at this point has marshy banks which take away much of the sameness which the canal would otherwise have, and also afford a splendid opportunity for experiments with aquatics, though little has yet been done in this direction.

Twelve years ago, when the first planting was made, comparatively little was known of the hardiness of a large number of trees, shrubs and herbaceous plants, as the number of species and varieties found in gardens was limited, but now 3,728 kinds of trees and shrubs, and over 1,600 perennials have been tested and notes taken on all of them. The number of individual specimens of trees and shrubs living in the Arboretum at the present time is more than 4,200. This large collection has been obtained from many sources. From donations of seeds from botanic gardens throughout the world a large number of species and varieties have been grown, the Royal Gardens, Kew, supplying many of them. The catalogues of nurserymen in America, Europe, and Asia have been searched to increase the collection until it is now difficult to obtain additional species of many genera.

Particular attention has been given to those genera which include a large number of hardy species, such as Syringa, Lonicera, and Berberis, and these have been made as complete as possible, as their usefulness extends over a larger area than those which are not so hardy.

Descriptive lists of hardy trees, shrubs and herbaceous perennials which have been found the most ornamental have been published, and have proven very useful to persons desiring to plant their grounds. A catalogue has also been published of all the trees and shrubs tested in the Arboretum up to the year 1899, and notes given as to their hardiness ; but in this list no descriptions are given.

The winter of 1900-1 caused more injury than usual to the trees and shrubs, some species and varieties which had hitherto been hardy having their tops badly winter killed. There were long spells of dry, cold weather last winter, and there was probably more evaporation from the wood than the trees could stand ; as confirming this opinion, some trees and shrubs which are not hardy and which grow late in the autumn and are thus well charged with sap when winter sets in, were no more injured than usual.

The Arboretum looked better this year than ever before, as more labour was given to it than previously ; the trees and shrubs also as they grow larger add to the beauty of it.

This year a nursery was established in part of the Arboretum in which were planted the trees and shrubs which are to be used by the Ottawa Improvement Commission for beautifying the city of Ottawa.

Few trees and shrubs were planted in the Arboretum this year, but 525 specimens of nearly as many species and varieties were imported from Europe and were grown in nursery rows this year as it was thought that better results would be obtained than if they were planted in their permanent places at once.

The collection of perennials was increased by 525 species and varieties this year, making a total of 1,586 species and varieties now living in the border. A large collection of species and varieties of Michaelmas daisies or wild asters which was planted this year added much to the attractiveness of the border this autumn. Some of the new varieties are very handsome and should be planted in every garden, as they bloom until killed by frost.

LILACS.

The lilac is one of the most popular hardy shrubs, which is due largely to the delicious perfume and delicate tints of the flowers, its extreme hardiness and ease of culture, and also to the fact that it begins to bloom during the month of May, when all flowers are much appreciated. The leaves develop early in the spring and do not fall until late in the autumn, which, with their attractive deep green colour, add to the beauty and popularity of this shrub. By making a judicious selection of species and varieties of lilacs, bloom may be obtained from the third week of May until the first week of July. It is an old favourite, the common species (*Syringa vulgaris*), having been cultivated more than three hundred years ago, but it is only during comparatively recent times that it has been improved and the exquisite varieties produced which are such an acquisition to our gardens. The first double variety was introduced in 1870. Although there are now 11 species in cultivation, most of these were introduced during the last one hundred years. There are 130 species and varieties being tested in the Arboretum which includes all the species and most of the varieties in cultivation.

The lilac may be propagated very easily either by budding or root grafting on lilac stock, which may be grown quite readily from seed or obtained as suckers from older bushes. It is quite possible also to graft the lilac on privet or ash, but these

stocks are not satisfactory. The lilac will also grow from green or ripe wood cuttings. Some of the varieties now to be obtained were originated by cross-breeding, and this work offers a very delightful field for him who will devote his time to it.

Lilacs grow well in many kinds of soil, but they do best in that which is moderately rich and well drained. They produce such an abundance of flowers and seeds that if grown in poor soil they will soon deteriorate. Suckers should be kept cut out of the older bushes, as these often are the cause of the shrubs not blooming well, and where grafted or budded varieties are grown it is absolutely necessary to do this. Very little additional pruning is needed. During recent years lilacs have been used quite extensively for forcing, the white varieties being the most popular.

Insects rarely injure the flowers or foliage of lilacs and they are seldom affected by disease, the leaves, however, being occasionally mildewed.

Following is a descriptive list of the species tested here and of the best varieties which have flowered. The species are arranged according to their time of blooming, beginning with the earliest :—

Syringa vulgaris, L. (Common lilac).—The common lilac is a native of Eastern Europe, and was introduced to cultivation in 1597. It is the best known of all the lilacs, being found growing in nearly every garden, but is often neglected and allowed to sucker badly, but even with this neglect it produces a profusion of flowers which are not surpassed in perfume by any of the newer varieties. It begins to bloom during the third week of May and lasts until near the end of the month. There are a much larger number of seedlings of this species than of any other and some of them are greatly superior to the parent, being of exquisite form and colour. Of these, 110 are being tested in the Arboretum, and the following are the best of those which have bloomed :—

S. vulgaris, Leon Simon.—A very double variety with a large compact truss and large flowers of a fine shade of lilac, with short petals. The buds are of a brighter tint which adds to its attractiveness. Blooms in the last week of May. One of the best doubles.

S. vulgaris, Maxime Cornu.—Double. Truss large. A very distinct variety, the flowers of which are almost pink. Very good. Blooms during the fourth week of May.

S. vulgaris, Charles X.—Single. This is one of the oldest yet one of the best of the improved varieties. It is a most profuse bloomer, no other variety excelling it in this respect. The trusses are large and the flowers of an attractive deep purplish red colour. It blooms a few days later than the common lilac, being at its best during the fourth week of May.

S. vulgaris, Jean Bart.—Double. Truss large and loose. Flowers double and of a fine shade of purple with twisted petals which give it a more graceful appearance than some of the more compact sorts. It is also beautiful when in bud, being then deep lilac. Very good. Blooms during the fourth week of May.

S. vulgaris, Jacques Calot.—Single. A free bloomer with large trusses and very large flowers, the latter being of an attractive shade of lilac. Blooms during the fourth week of May. One of the best.

S. vulgaris, Souvenir de Ludwig Spath.—Single. This is a variety with very dark purple flowers which makes a striking contrast to most of the other shades. Blooms in the fourth week of May.

S. vulgaris, Michel Buchner.—Double. A very free blooming variety with trusses above the medium size, and having large double flowers of a fine pale shade of lilac, the buds being of a rosy hue. Blooms during the fourth week of May. One of the best.

S. vulgaris, Furst Liechtenstein.—Single. Truss and flowers large, the latter being of an attractive lilac colour with a pinkish shade. A fine variety.

S. vulgaris, Madame Abel Chatenay.—Double. This is the finest double white lilac which has bloomed here. The trusses are of good size and the flowers double, pure white and of good substance. It is a most attractive variety and should be in every collection. Another double white variety called Madame Casimir Perier is said to be better, but this has not bloomed here yet.

S. vulgaris, Charles Baltet.—Double. A very free blooming variety with large flowers which are purplish lilac in the centre and approaching a pink shade towards the outside. Blooms in the last week of May.

S. vulgaris, La Tour d'Auvergne.—Double. This variety is at its best when part of the flowers are open and some still in bud, as there is a great contrast in the colour of the bud and the expanded flower. There are several shades of lilac in this variety, varying from light to dark. Blooms in last week of May.

S. vulgaris, Comte Horace de Choiseul.—Double. A free blooming double variety with a compact truss and attractive lilac flowers. Blooms in the fourth week of May.

S. vulgaris, Alba Grandiflora.—Single. This is a great improvement on the common white lilac, being a much freer bloomer and having a large truss and larger flowers. Very good. Blooms during the fourth week of May. Frau Bertha Damman is another fine single white variety.

S. vulgaris, Dr. Maillot.—Double. This is the latest flowering of all the varieties of *S. vulgaris* which have blossomed here and is one of the best. It is a free blooming variety with large trusses and exceptionally large double flowers of a very delicate pinkish purple. At its best during the first week of June. Very desirable for keeping up a succession of bloom.

Syringa oblata, Lindl.—This species was introduced to cultivation in 1859 and is a native of China. The foliage of this lilac is very attractive, the leaves being large and of a dark, glossy green colour ; their shape also differs very much from other species, being heart shaped. The flowers are not unlike those of the common lilac, but have more of a pinkish tinge than most of the varieties of that species. Desirable on account of its attractive foliage. There is said to be a white variety of this species, but it has not yet been tested here.

Syringa persica, L. (Persian lilac).—This species, as its name indicates, is a native of Persia, and was introduced to cultivation in 1640. It is not as robust a grower as the common lilac nor evidently as hardy, having gradually died out at the Experimental Farm. It is a small growing species, usually only reaching a height of five or six feet. The leaves are smaller than those of the common lilac which give it a more graceful habit. The flowers are of a bluish purple colour, not particularly attractive, and are borne in loose panicles. This species blooms during the fourth week of May while the common lilac is still in flower. There is a white and a cut-leaved variety, neither of which have yet done well here.

Syringa chinensis, Willd (Rouen lilac).—Thought to be a hybrid betwen *S. persica* and *S. vulgaris,* of which it has more the character of the former. It was introduced in 1795. Other names for this lilac are *S. rothomagensis* and *S. dubia.* This is a beautiful species, being a much stronger grower than *S. persica* and having better coloured flowers. It grows from six to eight feet in eight and has foliage intermediate in character between *S. persica* and *S. vulgaris.* It is a very free bloomer, the flowers being borne in large, loose panicles and are of an attractive purplish violet colour. It blooms a little later than the Persian, but at the same time as some of the varieties of the common lilac.

Syringa Josikœa, Jacq. Josika's lilac.—Closely following the common lilac in time of blooming is this species, which is a native of Hungary, introduced to cultivation in 1835. If this species flowered at the same time as the common lilac it would

not be as valuable, but it begins to bloom about the 1st of June when most of the varieties of the common lilac are over. It is a robust species and attains a height of ten feet. The foliage is deep green and the leaves large, thick and very glossy, making it quite attractive. The flowers are bluish purple and have no perfume and are not borne in as large trusses as the common lilac. This is a desirable species on account of its giving a succession of bloom and for its fine foliage ; it also makes a very good hedge plant, forming a stiff row and being very attractive on account of its glossy foliage.

Syringa Bretschneideri.—This is a species somewhat resembling *S. persica,* but is more upright in growth, more vigorous and hardier and with handsome foliage. By some authorities it is said to be *S. Emodi rosea* It is, however, quite distinct from anything else growing here. It is not of special merit as it blooms about the same time as some of the best varieties of the common lilac. The flowers are somewhat the same colour as the Persian, being a bluish purple.

S. villosa, Vahl.—A native of Northern China, and introduced in 1880. It is a strong grower and said to reach a height of six feet, though from present indications it will grow a little taller than that here. The leaves are rough and rather coarse looking, but this tends to make the shrub more striking. It flowers during the second week of June, closely following *S. Josikœa.* It is a free bloomer, the flowers, which are not highly perfumed, being pale bluish pink and the clusters of good size. This is a very desirable species.

Syringa Emodi, Wall.—A native of the Himalayan mountains, and introduced in 1840. There is very little difference between this and *S. villosa* as grown here, although those labelled *S. Emodi* have not proven so hardy and the leaves are larger. There is a variety, *rosea,* of this species and also one with variegated leaves.

Syringa pekinensis, Rupr.—This species is a native of Northern China, and was introduced in 1886. It is also sometimes called *Ligustrina pekinensis,* Regel. This species has not bloomed here nor proven perfectly hardy so far. There is a pendulous variety of it.

Syringa amurensis, Rupr.—A native of Manchuria and Japan, and introduced in 1863. It is a strong growing shrub and might be called a small tree, as the tendency is to have only one stem. It is of a moderately spreading habit and has attractive, clean looking foliage. The flowers are quite different from most of the other species, the individual blooms more resembling those of the privet. They are creamy white and borne in large, loose panicles, and also in smaller and more compact ones. This lilac begins to bloom about the beginning of the fourth week of June and is very striking.

Syringa japonica, Decne.—The Japanese lilac, sometimes known as the tree lilac, is a native of Japan, as its name indicates, and was introduced in 1885. It is very similar in habit of growth to *S. amurensis,* as grown here, the panicles of flowers, however are larger and more compact. It blooms more than a week later than that species, not being at its best until the first week of July. Both this and *S. amurensis* are very desirable. These close the lilac season.

Chemical Laboratory, Central Experimental Farm, Ottawa, Ont.

REPORT OF THE CHEMIST

(Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C.)

Ottawa, December 1, 1901.

Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the fifteenth annual report of the Chemical Division of the Experimental Farms. It will, I believe, be found to contain much of interest and value to the Canadian farmer, dairyman, and fruit grower. As formerly, the investigations carried on by this Division and now reported upon, though necessarily of a scientific nature, have been undertaken with the object of obtaining information of a practical character, and in this respect we have met with a very fair measure of success. The researches and analyses made relate to many of the various branches of agriculture, and hence our results should be found useful to a wide circle of readers.

As it would be quite impossible to give a detailed account of all the work accomplished in the Farm laboratories, we have inserted only the results of those investigations of greater importance and general interest, and which in a measure may be said to be completed. The nature and scope of the work is outlined in the following summary.

Soil Investigations.—These include the complete chemical analysis of certain representative soils from British Columbia, Ontario, Nova Scotia, and Prince Edward Island. The most important of the series examined, perhaps, are the examples from reclaimed marshes at the head of the Bay of Fundy. Among other interesting features, certain differences in character and composition between the newly deposited soils and those which have been for many years in cultivation, have been pointed out.

Soils representative of the Spallumcheen Valley, Okanagan, B.C., have been submitted to careful analysis, and suggestions made regarding the culture and maintenance of fertility of this most productive area.

A special examination for lime has been made in certain instances, to ascertain if there were any deficiency in this element. Soils from British Columbia and Quebec are reported on in this connection.

In connection with the question of the conservation of soil moisture, we instituted this year a series of experiments in the orchard of the Central Farm, Ottawa. The moisture was determined in the soil, (*a*) under cover crop, and, (*b*)under cultivation, to a depth of 14 inches once a fortnight throughout the season. The results are as interesting as those obtained last year from the soils on the Experimental Farms at Indian Head, N.W.T., and Brandon, Man., though differing somewhat in character, and will be found useful towards an understanding of the best modern methods of orchard tillage.

Fertilizers.—The substances reported upon under this caption are chiefly of the order which we have in previous reports designated as 'naturally occurring,' and include mucks, muds, limestone, factory wastes, wood ashes, sea-weed, &c.

Fodders and Feeding Stuffs.—The larger part of the work of the year has been in connection with these materials. We are, consequently, able to present results on the following important problems:—1. The changes in the composition of roots during storage. 2. The food and fertilizing values of the yields obtained from clover and

alfalfa by two and four cuttings, respectively. 3. The feeding values of (*a*) corn, and (*b*) clover, before and after ensiling. 4. The amounts of dry matter and sugar in farm roots.

In addition to the foregoing, we have examined sugar beets grown in the Northwest Territories, Manitoba and Prince Edward Island.

The recent increase in the price of meals and 'concentrates' in general has caused a keen interest on the part of farmers and dairymen in the comparative feeding values of the various milling by-products upon the market and much correspondence has been received on this subject. There is a desire on the part of many feeders to have the composition of the high-priced by-products—as regards protein and fat contents—stated by the manufacturers. It may be remarked that in several of the United States a law to this effect is in force, and the request appears to be a reasonable one. If it is considered desirable or necessary to afford protection to the purchaser of plant food in commercial fertilizers, it may well be argued that it is equally desirable and necessary to protect the interests of those buying animal food in the more expensive forms (gluten meal, &c., &c.) now coming into such extended use. In tabular form we present the analytical data obtained on a series of samples of germ meal, gluten meal and other important by-products in the manufacture of corn starch and glucose, examined in the laboratories here during the past year. Many of these materials are seen to have a high feeding value, but a consideration of the whole shows that there is sufficient difference in their nutritive qualities to make this inquiry one of importance.

Insecticides and Fungicides.—Analyses have been given of several brands of lye used in Canada and recently examined by us, as well as of certain other compounds used in the preparation of spraying mixtures.

Soft Pork Investigation.—The analytical work in connection with this research was brought to a close in May of the current year. The compilation of the data, which were very voluminous, and their consideration necessarily occupied a considerable time, so that it was well on in the year before the results and the deductions therefrom were ready for the press. We are glad to state, however, that in Bulletin No. 38, of the Farm Series, our conclusions from this important investigation have now appeared and been distributed. It is gratifying to note that this work has received the commendations of many engaged in pig raising and the pork packing industry, as well as the agricultural press.

Grass Pea (Lathyrus sativus).—It being held by some that the seed of this plant, which is now somewhat extensively grown in parts of Ontario, possessed poisonous qualities, a very thorough search was made by chemical means, but with negative results. This pea was also fed, almost exclusively, under our immediate supervision for some weeks to fowls, but no injurious effects could be observed.

Well Waters from Farm Homesteads.—A tabulated statement is given of the data obtained upon the samples submitted to analysis, together with a brief report as to the wholesomeness of the waters. It is gratifying to note that on comparing these results with those of former years, there appears to be a decided improvement in the quality of farm waters.

It seems again necessary to point out that instructions as to collection and shipment should be obtained before sending samples, in order to avoid mistakes that frequently render the analysis valueless.

Investigations in Progress.—A considerable amount of work has been done on the analysis of honey, chiefly with the view of distinguishing between ripe and unripe samples. It has been discovered that the ordinary analytical methods in vogue for determining the percentage of water in this article are defective and do not yield accurate results. Further work is necessary, and it is confidently hoped that during the coming year we may be able to perfect our processes. We shall then be in a position to furnish reliable information as to the composition of Canadian honey and to ascertain what differences may exist between the ripe and unripe product.

Another matter receiving attention is the comparative feeding value of fodder corn grown in hills and drills, respectively. Four well known varieties with this end in view are now in course of analysis.

Tuberculin.—We have, as in former years, prepared and forwarded tuberculin to the Dominion veterinary surgeons. During the twelve months ending November 30, 1901, 6,780 doses have been sent out.

Correspondence.—The letters received by this Division, in addition to those referred to us by the other departments of the Farm, numbered 1,213, from December 1, 1900, to November 30, 1901, and during that period 1,127 were despatched.

Samples Received for Analysis.—In the subjoined table will be found information as to the number and character of the samples received for examination. The number exceeds that of past years, and points to the popularity of this branch of work. As the demands upon our time increase, it is necessary to point out that the examination of such samples can only be undertaken as opportunity permits, and that the experiments instituted on the farm must, necessarily, have first attention. As far as is possible, help will be furnished as heretofore in this matter, but we must counsel patience and consideration on the part of our correspondents.

SAMPLES Received from Farmers for Examination and Report, November 30, 1900, to December 1, 1901.

Samples.	British Columbia	North-west Territories.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	20	4	2	72	15	5	5	4	127	27
Mucks, muds and marls	3	....	1	6	2	....	12	15	39	11
Manures and fertilizers	1	1	....	3	....	1	7	4	17	3
Forage plants and fodders	1	5	15	111	1	....	2	18	153	2
Well waters	3	3	14	37	10	12	2	15	96	0
Miscellaneous, including dairy products, fungicides and insecticides	2	7	2	40	11	1	4	2	69	9
Totals	30	20	34	269	39	19	32	58	501	52

Acknowledgments.—To the assistant chemists, Mr. A. T. Charron, M.A., and Mr. H. W. Charlton, B.Sc., I would again heartily tender my thanks for much valuable assistance during the past year. By their assiduous labours and their intelligent interest in the various investigations, has it alone been possible to overtake the work of this Division and to present the information contained in this report.

I am also much indebted to Mr. J. F. Watson, for most efficient help in connection with the correspondence and other clerical work of the Chemical Division. As in past years, his duties have been performed in a most careful and painstaking manner.

I have the honour to be, sir,

Your obedient servant,

FRANK T. SHUTT,

Chemist, Dominion Experimental Farms.

SOIL INVESTIGATIONS.

BRITISH COLUMBIA.

Spallumcheen Valley.—Our attention having been directed to the desirability of ascertaining the nature and possible deficiencies of the soil of this district, we obtained through the kindness of Mr. Donald Graham, of Armstrong, B.C., two samples, representative of the surface and subsoil, and accompanying which we received the following particulars and information. Mr. Graham writes : 'The two samples represent the Spallumcheen Valley as a whole. The soil was originally very rich and productive. It is still strong, although certainly failing somewhat in productiveness. We should like to know what it requires particularly to bring it up again, though perhaps not so much to bring it up as to keep it from failing any more. No. 1 is a black loam and covers this valley generally from a very slight covering in places to a depth of sometimes a foot or two. It has been cultivated for the past twenty years. No. 2 is the subsoil of the valley, but in places where coming to the surface it has been productive, although much harder to cultivate than No. 1. In such parts of the valley where there is not much (surface) loam, the soil is getting yearly harder to cultivate. The sample sent was taken from beneath the black loam forwarded, at a depth of a foot or more, and consequently I presume it to be richer than the clay that has been reached by the plough and cropped.'

Analysis of (air-dried) Soils.

	No. 1. Surface soil	No. 2. Subsoil
Moisture	3·80	3·81
Organic and volatile matter	12·28	7·70
Clay and sand (insoluble in acid)	65·46	63·51
Oxide of iron and alumina	15·80	21·15
Lime	·69	·82
Magnesia	·09	1·21
Potash	·83	1·09
Phosphoric acid	·23	·16
Soluble silica	·09	·05
Carbonic acid, &c. (undetermined)	·73	·50
	100·00	100·00
Nitrogen in organic matter	·415	·161

Available Constituents in Surface Soil.

	p. c.
Potash	·029
Phosphoric acid	·028
Lime	·316

No. 1. The chemical data give evidence of a high degree of fertility. Judged by the standards suggested by Dr. Hilgard, as well as those we have previously established from the examination of Canadian soils, I should conclude that this soil was well supplied with all the more important constituents of plant food. Indeed, it appears to the writer as a soil of more than average richness.

Further, the proportion of the mineral elements potash, phosphoric acid and lime, more or less immediately available, are very satisfactory, so that with a sufficient supply of moisture excellent crop yields should be obtained.

Towards the maintenance of its fertility we should counsel the application from time to time of an organic manure, and in this connection the growth and turning under of clover in districts where there is sufficient moisture to obtain a good 'stand,' offers itself as one of the most economical methods. The growth of the clover would no doubt be encouraged, and the land much improved, by a dressing of a fertilizer con-

taining lime and potash. Since marl (carbonate of lime) is obtainable in the neighbourhood, it might be tried, though if first burnt its effect will be more immediate. The continued or excessive use of quick lime, especially if unaccompanied by other manures, is not to be recommended, for though such treatment might give larger yields for a few years, it would tend eventually to exhaust the soil. The value of clover as a fertilizer has in past reports been fully dealt with in all its phases, and it is only necessary to remind our readers that clover is a moisture-loving plant, and consequently it is practically impossible to ensure its vigorous growth unless the soil contains a sufficiency of moisture. It is possible that alfalfa, being a deeply-rooted legume, might give a better return than clover, but being of a slower and somewhat more difficult growth, it does not offer itself as a desirable substitute for the purposes of 'green manuring,' when the land is being worked under a short rotation. The question of rotation is also one that has much to do with the maintenance of fertility, for there is no doubt that land continuously under one crop—and especially one demanding the active cultivation of the land and making great demands on the store of available plant food—will fall off in productiveness much more quickly than one under a system which calls for a due succession of crops.

The physical texture of this soil, judged from the sample forwarded, appears to be excellent, no doubt due largely to the favourable proportion of organic matter present. A mechanical separation shows, approximately, 55 per cent of coarse sand—a fact that places it in the category of soils well adapted to general cultivation.

No. 2. In the larger number of the determinations this subsoil shows that plant food is abundantly present, though the fact that the soil bakes into hard masses indicates that drainage is desirable, and that a dressing of lime would be beneficial.

ONTARIO.

Welland County.—Two samples of soil from South End, Welland county, and which were fairly representative of the cultivated lands of the district, have been examined with a view of obtaining information as to their character, their possible deficiencies and most economic methods of treatment. Most of the soils in this district—which has long been favourably known as adapted to fruit growing—have been tilled for a number of years, and consequently where not kept up with manures they are to be considered as 'partially exhausted.' It is of the latter order that the soils examined are to be considered.

Our correspondent in forwarding the samples furnishes the following particulars regarding them:—'No. 1. This has been in grapes for several years, perhaps twelve. To my knowledge it has not received any manure or fertilizer for at least four years, and probably for a still longer period. It has been well cultivated. It would average about one foot in depth, and is underlaid by a heavier clay. No. 2 was cropped—blue grass and timothy—three or four years prior to 1897, when it was ploughed and sown to fall wheat; crop, 20 bushels to the acre, 1898. Oats, 1899, potatoes and turnips, and trees (orchard) planted in 1900 with no crop, but well worked. Subsoil, clay, as in No. 1.'

Analysis of (air-dried) Soils.

	No. 1. Grapery.	No. 2. Orchard.
Moisture	1·23	1·47
Organic and volatile matter	4·91	7·07
Clay and sand (insoluble in acid)	84·25	81·74
Lime	·23	·32
Potash	·35	·39
Phosphoric acid	·10	·11
Nitrogen, in organic matter	·126	·231
Available phosphoric acid	·0112	·0141
Available potash	·0098	·0195
Available lime	·110	·188

A mechanical separation of the clay and sand showed that No. 1 contained 62·70 per cent, and No. 2, 70·00 per cent, coarse sand. They are, therefore, to be considered essentially as sandy loams.

Judged from the chemical standpoint, No. 2 is the better soil, being richer in organic matter and nitrogen, in addition to showing somewhat larger percentages of lime, potash and phosphoric acid, more especially in the available condition. The reason for the better quality may, perhaps, be found in the well known fact that land under active cultivation loses in fertility much quicker than that in sod—indeed, the latter if pastured, will improve, more particularly in available constituents.

No. 1. The data indicate that as regards mineral constituents this soil is below the average of fairly fertile soils, and that for most crops the application of a fertilizer containing all three elements—potash, phosphoric acid and lime—would prove beneficial. The soil has a distinctly acid reaction, due, no doubt, in large part to deficiency in lime, and, therefore, wood ashes or Thomas' slag and a potash salt are suggested as fertilizers.

No. 2. This soil is of fair average quality and should give good returns. It could, however, be improved by treatment such as suggested in the preceding paragraph.

Speaking generally of such soils, we should say that being somewhat sour and naturally deficient in lime, an application of lime—or, better still, a fertilizer furnishing not only lime, but also phosphoric acid and potash—would be advantageous. As a source of phosphoric acid, Thomas' or basic slag could be advised.

Further, to improve tilth and absorptive capacity for moisture, both soils, but especially No. 1, would be the better for an organic manure, and especially one which would at the same time increase the store of nitrogen. The growth and turning under of clover furnishes an economical means to that end.

NOVA SCOTIA.

Marsh Soils from the Bay of Fundy.—Among the most valuable and fertile soils of Nova Scotia and New Brunswick are the reclaimed salt marsh lands which border on the Bay of Fundy. Many of these have produced, for a long term of years, without the application of any manure, remunerative yields of hay, and consequently are soils justly esteemed in the maritime provinces as of the highest agricultural importance. Besides their suitability for the raising of hay, many, no doubt, by reason of their composition and texture, are capable of giving profitable returns in ordinary field and market garden crops.

The salt marsh areas, before being dyked and drained, may present one of several aspects. Frequently they appear as bare deposits of tidal mud, the depth of which may be many or only a few feet. This is generally full of the undecomposed remains of eel grass (*zostera marina*), a plant of little direct agricultural value, but of the greatest service in the formation of these marshes, and in supplying their soils with organic matter. At other places, these marshes are found covered with a thick, matted sod resulting from the growth of salt grasses that followed the eel grass and overlying the tidal deposit.

Dyking to keep out the sea-water, and thorough drainage to remove the salt and excess of water, are the two initial processes necessary towards reclamation. Once these are effectively accomplished, the land is easily brought into cultivation, and is found, as already stated, to be most productive. It is the practice of some farmers to occasionally let in the tide for a short period, so that the soil may be recovered for a time. This plan, though it rejuvenates the soil, necessitates the lapse of a year or two, to allow the washing out and carrying away of the salt with which the sea water has impregnated the land. Marshes from which the salt has not been removed will not grow timothy, and the quality of the salt grasses produced is of a decidedly inferior character.

In several of the past reports of this Division, analyses have been given of the marsh 'mud' as deposited by the tide, and which is very generally used on all lands adjoining the Bay of Fundy, as an amendment or fertilizer. Hitherto, however, we have not had the opportunity of making any systematic examination of the soils of the reclaimed marshes. This important work has, through the co-operation of Professor Wm. F. Ganong, been partially accomplished during the past year, and the analytical results obtained are here presented.

The samples, five in number, were collected and forwarded by Professor Wm. F. Ganong, who for some years past has been making a critical study of the reclaimed salt marshes which lie at the head of the Bay of Fundy. It was thought by him that there might be some relationship between the character and composition of these soils—which have all been deposited by the tide—and their vegetation, and that a knowledge of this relationship might be of economic, as well as scientific, value. Recognizing the significance of this conjecture, and knowing that large and important agricultural interests are closely identified with these reclaimed marshes, both in New Brunswick and Nova Scotia, the analysis of these soils was undertaken. The data are not only exceedingly interesting from a scientific standpoint, but are of value in indicating the character of these soils and in furnishing information that may be of use to the practical farmer as to the best treatment of these marshes.

The following particulars are furnished by Professor Ganong :—

Description and Location of Soils.—No. 1. Marsh land. From near Aulac river, opposite Pointe de Bute. Has yielded heavy crops of timothy and associated grasses for at least forty years without ploughing, tiding, fertilizing or other cultural treatment.

No. 2. Soil from low part of marsh producing very poor grass. Patches surrounded by very good grass. Near Missequash river, opposite Pointe de Bute. Here and there on the good marsh are areas of a few square yards on which there is a poor growth, and this No. 2 is a sample from one of these. Deposit very deep, known to be twenty feet or more.

No. 3. Mud freshly brought in and laid down by the tide at mouth of Tantramar river, on a piece of marsh being newly 'tided.' A sample of the deposit of which the entire marshes are built ; the original marsh material unaffected by any vegetation.

No. 4. Blue clay, from 18 inches below the surface in a damp place inside the company's canal, near Missequash river, above Pointe de Bute. The red mud changes to this where drainage is poor. It then bears a coarse, nearly useless, vegetation. Deposit, many feet deep. Extremely poor soil and needing improvement.

No. 5. Brown mud, from 2½ feet below the surface, inside the company's canal, near Missequash river, above Pointe de Bute. Being thus below the surface, this soil has never borne crops directly, though it is penetrated by roots of the grass on the ordinary cultivated marsh land above. Deposit is many feet deep.

On arrival at the laboratory, the following notes were made on the samples, all of which were in an air-dried condition :—

No. 1. Of a distinctly red colour ; in small lumps easily broken between the finger and thumb, and containing a considerable amount of root fibre. For a marsh soil, it has the appearance of being in a very fair mechanical condition, though possibly it might be improved in this respect by drainage.

No. 2. In larger and less friable lumps than No. 1, of a grayish-blue colour with streaks of reddish soil through them. The colour and condition point to insufficient aëration, resulting no doubt from the drainage being imperfect.

No. 3. In layers something like shale, one-eighth to one-fourth inches in thickness, distinctly red, and easily broken. Has more the appearance of a rock than a soil.

No. 4. In exceedingly hard, tenacious lumps, bluish-gray, but showing many streaks of a greenish-yellow colour.

No. 5. In reddish lumps, easily broken. Not unlike sample No. 1, but not showing any root fibre.

The samples for analysis were made on the 'fine earth' prepared by first removing all fibre and pebbles and then grinding and seiving the remainder. In the determination of the 'total' constituents, hydrochloric acid, specific gravity 1·115, was used as a solvent, digesting the soil for 10 hours at the temperature of the water-bath. For the estimation of the 'available' potash, phosphoric acid, and lime, 1 per cent solution of citric acid was employed, digesting in the cold for 5 hours with frequent agitation.

CHEMICAL Analyses of Soils from the Head of the Bay of Fundy, 1901.
Results calculated on water-free Soils.

No.	Organic and Volatile Matter.	Clay and Sand.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Potash.	Phosphoric Acid.	Soluble Silica.	Carbonic Acid (undermined).	Total.
1.	6·54	75·29	14·72	·239	·513	·817	·136	·091	1·654	100·0
2.	10·60	73·18	12·64	·234	·397	·852	·124	·059	1·914	100·0
3.	6·02	75·83	13·79	·652	·283	·902	·146	·063	2·314	100·0
4.	6·77	76·01	14·01	·409	·183	·996	·094	·056	1·472	100·0
5.	3·10	84·48	9·87	·288	·154	·646	·110	·063	1·289	100·0

No. *(Continued.)*	Nitrogen.	Available Elements.			Reaction.
		Potash.	Phosphoric Acid.	Lime.	
1.	·182	·0088	·0260	·0626	Acid.
2.	·338	·0340	·0160	·0449	"
3.	·122	·0748	·0466	·3970	Neutral.
4.	·106	·0073	·0436	·0792	Acid.
5.	·062	·0300	·0354	·1080	"

The data in the subjoined table have been furnished by Professor Ganong. They give the proportions of the various soil-forming constituents in the example under investigation.

Mechanical Analyses of Marsh Soil.

—	I. Timothy land unploughed and cropped over 40 years	II. Low places in hay marsh where agrostis grows.	III. Brought in fresh by tide.	IV. Blue clay from 18 in. below surface.
Water	2·200	2·600	1·800	3·160
Organic matter	6·505	10·920	6·200	7·360
Gravel	·025	.....	1·125	·125
Coarse sand	·275	·400	3·100	·325
Medium "	4·125	·285	2·025	2·400
Fine "	9·360	1 900	4·225	6·210
Very fine "	22·185	1·300	45·275	33·885
Silt	36·165	50·110	14·125	20·375
Fine silt	10 390	17·735	12·400	10·865
Clay	8·585	10·530	9·660	15·200
	99·815	95·780	99·935	99·905

The proportion of Salt in Marsh Soils.—Since the fertility of marsh depends in a large measure upon the thoroughness with which the common salt has been eliminated, a determination of this constituent was deemed advisable. The percentages obtained are as follows, and represent the amounts present in the water-free soils :—

	Common salt per cent.
No. 1	·037
No. 2	1·048
No. 3	4·16
No. 4	·939
No. 5	·217

Conclusions and Suggestions.—No. 1. As regards humus (organic matter) and nitrogen, this soil would compare well with those of fair average richness, the percentages of nitrogen in such usually being between ·1 and ·2 per cent.

The lime-content agrees with that found in many Canadian sandy loams of average fertility, which as a rule lies between ·1 and ·3 per cent. It cannot, however, be considered as rich in this constituent.

The total potash in this, as in the other members of the series, is much higher than in most of our virgin soils. It most probably exists in the form of double silicates, and would be gradually liberated in an assimilable condition under good methods of soil culture and favourable climatic conditions.

The percentage of phosphoric acid is somewhat lower than that in Canadian virgin soils of average fertility, but as we shall see shortly, a large proportion of this is in an available form.

This soil, as also Nos. 2, 3 and 4, is characterized by a large percentage of oxide of iron a feature that frequently betokens, when the iron is fully oxidized (by aëration which follows efficient drainage and good cultural methods), a favourable condition for plant growth.

The immediate fertility or crop-producing power of a soil as contrasted with that which is latent, is measured by the percentages of the essential elements necessary for plant nourishment that are available, rather than by the percentages extracted by hot hydrochloric acid—the solvent employed in the usual methods of analysis. The amounts of the so-called available elements are obtained by using an acid solution which is approximately equal in solvent power to that exuded by the roots and rootlets of plants. Such a solvent is a 1 per cent solution of citric acid.* By this method, known as the Dyer method, after the chemist who introduced it in 1894, this soil (No. 1) appears to be fairly well supplied in available phosphoric acid, but somewhat below the average of fertile soils as regards available potash, probably resulting from its removal by the hay crop during the long term of years the marsh has been cut. Further, it seems probable that this soil is somewhat deficient in its store of available lime.

In character, it may be classed as a sandy loam, containing fair proportions of clay and organic matter.

It is exceedingly interesting and satisfactory to note that in this soil the salt has been so thoroughly washed out. Of all the samples it contains the least. The extent to which this removal has taken place will be evident on comparing the percentage in this soil (·037) with that in No. 3 (4·16), which is newly laid down marsh.

Considered generally, we might prejudge the soil as one capable of yielding good crops under favourable climatic conditions, but one also that might have its productiveness increased by occasional manurings and thorough drainage where necessary to

*A full discussion of the character of many Canadian virgin soils, standards of fertility and methods of analysis, is to be found in the Report of the Chemist of the Experimental Farms, 1897.

improve its mechanical condition. Were we asked to make suggestions regarding the nature of the manures to be used we should advise, since it is hay land, the sowing of clover from time to time, which would enrich the soil in humus and nitrogen, and a dressing of bone meal 200 pounds, superphosphate 100 pounds, and muriate of potash 75 pounds, these quantities being for one acre. It is quite probable that a simple dressing of lime, 20 to 40 bushels per acre, might much increase the yield.

No. 2. Though in many features this soil is similar to No. 1, there are certain data which show it to be richer in plant food. Thus, in nitrogen and organic matter, the percentages are almost double those in No. 1. It is also much richer in total and available potash. The phosphoric acid, however, present in the available condition is considerably less than in the preceding sample.

With better drainage, through aëration, and good culture, this soil should give returns equally as good as those from No. 1. There is no evidence of any particular want of plant food or of the presence of any deleterious compounds, save those which naturally form in a water-logged soil from which the air is excluded.

We are of the opinion that in addition to drainage and aëration, an application of lime would prove of benefit, sweetening the soil and converting the poisonous iron compounds, formed by the causes mentioned in the preceding paragraph, into innocuous forms.

The comparatively speaking large amount of salt present strongly indicates poor drainage, and serves to support the view taken that the requirements of this soil are mechanical rather than chemical.

No. 3. This sample is of particular interest as furnishing data regarding the composition of the tidal deposit as laid down. It seems to contain both mineral and organic constituents in very fair quantities, and gives evidence of possessing all the requisites for forming a good arable soil under suitable treatment.

On comparing the amounts of the organic matter and nitrogen of freshly deposited marsh with those of old marsh soil (No. 1), it will be observed that the latter is somewhat the richer in these constituents. This agrees with the generally accepted view, that in soils under sod continuously the percentages of humus and nitrogen tend to increase.

The percentage of lime is nearly three times that in soils Nos. 1 and 2, and seems to indicate that the 'mud' as deposited is richer in this element than the marsh lands are after years of cultivation. If this is the case, an explanation is furnished in the fact that a considerable quantity is annually withdrawn by the crop. We, further, are aware that lime has a tendency to 'work down' into the subsoil. This soil, it will be noticed, is the only one of the series that does not show acidity, a very significant fact.

The amount of salt, as might be expected, is very high. That, however, it can be readily removed through drainage has been already shown.

No. 4. While the percentages of plant food, with the exception of potash, are not equal to those of many soils of good average fertility, there are no undesirable features save the 'sourness' of the soil and its very bad mechanical condition, both of which are capable of removal or improvement by drainage, aëration and the application of lime. Its chief deficiencies, if such they may be called, are nitrogen and phosphoric acid.

The necessity for better drainage is emphasized by the amount of salt present, nearly 1 per cent.

No. 5. From the position of this sample, it must be regarded as of the nature of a subsoil, and consequently its very small percentages of nitrogen and organic matter are not to be considered as abnormal. This sample presents many similarities to the other soils of this series, though there are notable differences between this and the four preceding soils in the much smaller percentage of oxide of iron it possesses.

PRINCE EDWARD ISLAND.

Marsh Soil.—Respecting this reclaimed land, the inquiry is received: 'Will timothy and clover thrive upon it?' Mr. Richard Egan, of Mount Stewart, P.E.I., in sending the marsh soil for analysis says: 'The land was formerly flooded by salt water. Some three years ago an aboideau was constructed, and for two years after good crops of marsh hay were taken from it. Now there is hardly any crop—the marsh grasses are apparently dying. There are over 500 acres of this land owned by different farmers, who are at present suffering a great loss.'

When received, the sample consisted of granular masses and a small amount of powder, of a light gray colour, mixed with many fragments of vegetable fibre, chiefly of eel grass. From the appearance and construction of the soil particles it would seem as if they were formed by the deposition of a fine silt about the partly disintegrated fibre. The whole was of a very loose, light texture.

To ascertain, if possible, the cause of the alleged sterility, we made an examination of the soil and obtained the following data:—

Analysis of (air-dried) Marsh Soil.

Moisture	3·29
Organic and volatile matter	15·79
Mineral matter, insoluble in acid	60·10
Mineral matter, soluble in acid	20·82
	100·00
Lime	·31
Nitrogen	·45
†Common salt	·31
*Sulphate of lime	·93

†Calculated from chlorine. *Calculated from sulphuric acid.

It would appear from these figures that as regards nitrogen and humus there is no deficiency; indeed, the amounts present show that in these constituents the soil is particularly rich, though no doubt much of the nitrogen is not in an assimilable condition.

No determination of the percentages of the potash and phosphoric acid present was made, but we feel assured from past work upon virgin marsh land that the trouble cannot be due to lack of these elements.

The amount of lime, ·31 per cent, indicates that this element is not wanting.

The soluble chlorides and sulphates (common salt, sulphate of lime) present, though not excessive, would suggest the desirability of more thorough drainage if timothy and clover are to be sown. Possibly a fair growth of the cultivated grasses could now be obtained, and every succeeding season, provided the showers can wash out and carry away the salt, the conditions for their development would be improved.

The skilful culture or working of the land, in addition to drainage, would no doubt assist in bringing about that texture or mechanical condition of the soil necessary to the vigorous growth of timothy and clover. At present it seems to be too light and porous, and though these qualities are conducive to the sweetening and aëration of the soil, a firmer and more compact tilth is desirable for cultivated grasses. To this end it might be desirable to cultivate the land one or two seasons with a root crop, furnishing sufficient manure to give the young plants a good start.

There is another course open, but it means the growing of the coarser, less nutritious salt grasses. If the marsh were flooded, the probability is that much of the apparently dead marsh grass would revive, and in a season or two a good crop of hay procured. This method would, of course, preclude the possibility of growing timothy and

clover, and we should therefore advise a careful scrutiny of the marsh and the trial of timothy and clover on the better drained portions, before resorting to the latter plan and letting in the salt water. Though possibly there may be marked differences in the qualities of these tidal deposited soils, we do not know of any instance where the land has not yielded to a proper and thorough system of reclamation, giving remunerative crops of cultivated grasses as soon as the salt has been sufficiently washed out and the soil become well aërated and, in such cases as this, well compacted.

SOILS EXAMINED FOR DEFICIENCY IN LIME.

Many soils are received respecting which information is merely sought as to their richness in lime, so that their future treatment as regards this form of plant food may be in accord with the best practice. These samples, as a rule, are tested qualitatively, and from the results obtained an opinion is forwarded as to the necessity or desirability of a lime application. Occasionally, however, when these soils are representative of large areas they are submitted to a quantitative analysis, estimating the total lime, and also the proportion soluble in 1 per cent citric acid, which we must suppose indicates approximately the amount readily available to plants. We may insert the analysis of a few of these, since the placing on record of the data will make them available for future reference.

Labelle County, Quebec.—Three clay soils sent by the Hon. W. Owens, Montebello, and considered as deficient in lime:—

	Total Lime.	Available Lime.
No. 1.	·462	·448
No. 2.	·791	·089
No. 3.	·679	·116

No. 1. This appears to be a fairly good soil, though capable of improvement, probably by judicious culture. It contains a considerable amount of humus (organic matter) and nitrogen, and I should judge, is by no means deficient in the other elements of plant food.

Regarding its lime content—the chief object of this inquiry—our results show a fair, though not large, percentage. Analysis further indicates that by far the larger quantity of this lime is in a more or less readily available condition. Though one cannot speak positively, the data do not indicate that the soil stands in need of a dressing of lime.

No. 2 and No. 3. Clay loams are similar soils, though I should consider the latter somewhat the more refractory of the two. Both, in my opinion, would be benefited by an organic manure (barn-yard manure or clover turned under) and an application of lime. It will be noticed that, though these soils contain a larger percentage of total lime than No. 1, their percentage of available lime is very much less. They give a faintly acid reaction to litmus paper, a fact which confirms the deduction from the available lime estimation. From a mechanical as well as a chemical standpoint, I think lime would improve these soils.

Enderby, Kamloops Division, E. Yale, B.C.—The soil is a stiff clay, and is described by Mr. Frank Hazard, who sends the sample, as 'rich wheat land, giving heavy crops.' It is, however, 'very difficult to work, and can only be ploughed in dry weather. It breaks down with the frost.' When received at the laboratory, it had dried into hard, refractory lumps and masses. Information is sought as to what may be added to the soil to improve its texture and render it more easily worked.

A partial analysis afforded the following data:—

Moisture	7·18
Organic and volatile matter	10·59
Oxide of iron and alumina	24·68
Lime	1·21
Nitrogen in organic matter	·301

An estimation of the lime soluble in 1 per cent citric acid solution gave ·075 per cent.

As regards nitrogen, the soil must be considered much above the average, and this fact no doubt in a large measure accounts for the high productiveness of the land and its suitability for wheat growing. It is also very well supplied with organic matter. In lime, the percentage obtained by using hot, strong hydrochloric acid as a solvent, is by no means insignificant, but that a very small proportion exists in an active and assimilable condition is evident from the small proportion soluble in dilute citric acid, viz., ·075 per cent.

It seems, therefore, from our examination that this is to be considered a rich soil, but one that might be improved by thorough drainage, careful working and the judicious use of lime. An application of this 'amendment,' say, at the rate of 40 bushels per acre, harrowed under, would, we believe, increase the soil's productiveness, and in conjunction with drainage, weathering and 'dry' working of the land, materially ameliorate its physical condition.

The continued use of lime makes it desirable to supply the soil from time to time with organic matter. This, of course, may be done by an application of stable manure, but when there is only a limited supply of this available it will be advisable to have recourse to the turning under from time to time of a green crop—preferably one of the legumes, such as clover or pease.

THE RELATION OF 'COVER' CROPS AND CULTIVATION TO SOIL MOISTURE.

For some years past there has been a keen interest evinced by the orchardists and fruit growers of Ontario and eastern Canada in the question of cover crops followed by bare cultivation. The subject is being continually discussed as one of first importance in the horticultural press and at fruit growers' conventions, and there is already on record a considerable amount of practical experience, chiefly of a favourable character, regarding this system of soil treatment. The old method of allowing orchards to remain in permanent sod is being abandoned and in its place this plan is being adopted.

With a view to obtaining data that might prove valuable, more especially towards suggesting a rational treatment of orchard soils in eastern Ontario and adjacent areas in Quebec, we have, with the co-operation of the horticultural division, carried on during the past season certain investigations in the orchards of the Experimental Farm, Ottawa. This work has furnished results of some importance, and will, we think, prove of more than ordinary interest to many of our readers.

We may briefly at the outset state the plan of the system and the principles underlying it.* The land is ploughed in late spring—usually between the latter part of April and the middle of May—and kept thoroughly cultivated until early in July, when one of the legumes, generally mammoth or common red clover, is sown. This, as a rule, is allowed to remain till the following spring, possibly the second or third week in May, when the growth is turned under with the plough and the soil cultivated as many times as is deemed necessary until the beginning of July, when clover is again sown. According to the nature of the soil and the rainfall to be expected in the district, the dates for these operations must be varied somewhat; thus, if drought usually prevails in the early summer months the ploughing under of the clover should not be later than the middle of April—even if there be little or no spring growth—so that by cultivation the spring showers may be conserved. On the other hand, if a generous and well distributed precipitation may be expected the clover may be allowed to remain growing throughout the summer, mowing the crop when necessary. The objects of the system are, primarily, the enrichment of the soil with humus and nitrogen and the conservation of moisture for the use of the trees during the drier months of summer, and incidentally the aëration of the soil and the liberation of its plant food. It also

*For a fuller account, the reader is referred to Bulletin No. 37, Experimental Farms Series, recently written by Mr. W. T. Macoun, Horticulturist, C.E.F.

includes the protection of the tree roots during the winter months. It may also be pointed out that the growth of the clover during the late summer and autumn is expected to utilize soil moisture (that would otherwise serve to keep the trees growing and thus prevent wood duly ripening before winter), and serve to retain the nitrates which might otherwise be lost.

The present investigation was undertaken to obtain data upon one of these features only, viz., relation of cover crop and cultivation to soil moisture. Two areas in the farm orchard were selected and are denoted in the table of results as A and B. The soil on both is light, sandy loam, rather deficient in humus. Particulars as to dates of sowing, ploughing under of the clover, &c., may be briefly stated as follows:—

'A.' In cherry orchard. Clover was sown May 16, 1900, on the plot designated 'Under Crop,' and allowed to remain during the season of 1901.*

The plot 'Cultivated' was planted in 1900 with pease and other vegetables, and in 1901 with vegetables and strawberries. It was constantly cultivated and kept free from weeds throughout both seasons.

For two successive seasons, therefore, the one plot has been in clover, while the other has been kept cultivated.

'B.' In plum orchard. Clover was sown over the whole of this plot on April 28, 1900. On the portion designated 'Cultivated' it was ploughed under April 18, 1901, and the soil cultivated from time to time throughout the season.

The samples of soil, taken every two weeks from May 6 to October 21, 1901, inclusive, were obtained by means of special canisters which secured the soil to a depth of 14 inches. The percentages of moisture and the calculated amounts of water per acre (see table) therefore, represent to that depth the condition of the soil in regard to water-content.

The rainfall statistics have been given, the figures indicating the precipitation during the period between the taking of each set of samples. For practical purposes, an inch of rain means 100 tons of water per acre.

AMOUNT of water, per acre, in soil to a depth of 14 inches (*a*) Under crop and (*b*) Cultivated. Estimations made every two weeks from May 6 to October 21, 1901.

Collection of Sample.	Rainfall.	A.				B.			
		Under Crop.		Cultivated.		Under Crop.		Cultivated.	
		Moisture.	Water per acre (calculated).	Moisture.	Water per acre (calculated).	Moisture.	Water per acre (calculated).	Moisture.	Water per acre (calculated).
	Inch.	p. c.	Tons. Lbs.	p. c.	Tons. Lbs.	p. c.	Tons. Lbs.	p. c.	Tons. Lbs.
May 6..	1·33	6·14	130 565	11·55	260 131	9·57	198 520	9·93	206 1,088
" 20..	2·74	12·48	283 1,983	15·03	352 566	15·22	336 472	13·58	294 563
June 3..	2·13	10·99	245 1,798	14·50	337 1,508	14·09	307 347	14·64	321 439
" 17..	1·31	7·29	151 419	13·32	306 88	8·64	177 244	9·30	192 189
July 2..	1·73	4·32	89 1,842	8·84	193 257	8·28	168 1,060	10·76	225 1,646
" 15..	1·26	6·17	130 1,817	9·89	216 374	4·74	93 386	7 99	162 1,291
" 29..	1·37	9·29	203 1,934	14·03	325 39	10·19	212 1,007	15·08	332 1,176
Aug. 12..	4·17	13·63	314 558	13·83	319 1,285	13·58	294 614	15·60	346 329
" 26..	0·29	6·68	142 1,121	8·67	189 14	12·45	266 670	11·08	233 1,876
Sept. 10..	0·52	4·93	103 543	9·73	214 229	4·96	97 1,498	7·96	161 1,963
" 23..	1·68	9·75	214 1,207	11·07	247 1,712	10·57	221 728	12·67	271 1,449
Oct. 7..	1·93	10·54	234 1,288	12·69	289 932	10·67	223 1,417	16·01	357 18
" 21..	0·67	11·76	264 1,715	12·77	290 1,853	13·32	287 1,624	14·99	330 519

*The crop was not ploughed under in spring of 1901, as the soil was considered to possess an abundance of moisture and the enrichment of the soil with humus and nitrogen was chiefly sought.

Plot 'A.' Though during the 24 weeks of the investigation the moisture content is seen to fluctuate considerably, it is invariably greater in the 'cultivated soil.' This is strictly in accord with theory, based on experimental data. The soil in crop loses more moisture by capillarity than that cultivated, and also parts with a considerable amount by transpiration through the leaves of the clover.

The greatest differences, especially during the earlier months, are observable when the precipitation is least. Thus, on May 6, the total rainfall to date was only 1·33 inches, and the excess of moisture in favour of the 'cultivated' land was practically 130 tons per acre. At this time there was a vigorous growth of the clover, and much moisture was consequently being withdrawn from the soil for its development. This teaches an important lesson, as it is from May 1 to the middle of July that we wish particularly the trees to be supplied with all the moisture necessary for their growth. The value of cultivation during this period, if the season is dry, will be proportionally much greater than if there is a fair rainfall. The season of 1901 during its earlier weeks shows a fairly well distributed precipitation, but nevertheless, the data fully confirm this conclusion.

		Rainfall.	Excess of Water, per acre, in cultivated land.	
		Inches.	Tons.	Lbs.
May	6	1·33	129	1,566
"	20	2·74	68	583
June	3	2·13	91	1,710
"	17	1·31	154	669
July	2	1·73	103	1,415

The converse of the proposition considered in the preceding paragraph is also true: The greater the precipitation, the less the difference in moisture content between the soil of the crop-covered and cultivated plots. In illustration of this, we might refer to the differences for May 20, June 3, and August 12, recording the largest rainfalls. The heaviest fortnightly precipitation of the season is for the two weeks preceding the last mentioned date, viz., 4·17 inches, when the difference in favour of the 'cultivated' soil is only 5 tons per acre.

From the 1st July the system seeks to provide the orchard soil with a cover of vegetable growth, which serves (1) to utilize any excess of soil moisture, thus checking the development of the tree and promoting the ripening of its wood, (2) to furnish the roots of the trees with a protection against frost, (3) to enrich the soil in humus and nitrogen, and thus improve it mechanically and chemically, and (4) to assimilate and retain the nitrates formed during the summer months. It is with regard to the first of these only that we shall now present data.

Plot 'A.'—Commencing with July 15, it will be noticed that in the cultivated soil, as heretofore, there was always an excess of water over that present in the soil supporting a growing crop. In other words, there was invariably less soil moisture available for those trees where the clover was growing than for those in the bare and stirred soil. This is more readily seen from the subjoined table:—

		Rainfall.	Decrease in amount of Water, per acre, due to growth of Cover crop and capillary action.	
		Inches.	Tons.	Lbs.
July	15	1·26	85	1,557
"	29	1·37	121	5
August	12	4·17	5	717
"	26	·29	46	893
Sept.	10	·52	110	1,686
"	23	1·68	33	505
Oct.	7	1·93	54	1,644
"	21	·67	26	138

Any extended comment on these results is unnecessary, their character is sufficiently pronounced to tell their own story. The amounts of water which may be con-

sidered as utilized by a growth of clover during the middle and late summer months are very large. In some instances we find that as much as 50 per cent of the soil moisture can in this way be appropriated. Thus, on September 10, after a month in which only ·81 inches of rain fell, the orchard soil carrying a crop of clover contained per acre to a depth of 14 inches 103 tons of water, while the adjacent area that had been kept cultivated possessed to a similar depth 214 tons.

Plot 'B.' This portion of the orchard gave results pointing in the same direction as those of Plot 'A.' On 11 dates out of the 13 on which the collections were made there was an excess of moisture in the cultivated soil.

		Rainfall.	Excess, of Water, per acre, in cultivated soil.	
		Inches.	Tons.	Lbs.
May	6	1·33	8	568
"	20	2·74	.....	.....
June	3	2·13	14	92
"	17	1·31	24	1,945
July	2	1·73	57	586
"	15	1·26	69	905
"	29	1·37	120	169
August	12	4·17	51	1,715
"	26	·29	.....	.....
Sept.	10	·52	64	465
"	23	1·68	50	721
Oct.	7	1·93	133	601
"	21	·67	42	895

From May 6 to July 2, the differences are not so large as those for Plot 'A.' This was partly due, no doubt, to the soils not being identical in character and humus-content, but also in a great measure, we believe, to the less luxuriant growth on Plot 'B,' and to the fact that upon it grass had in a large measure supplanted the clover.

Then again, the cultivated portion of Plot 'A' had been cultivated during the previous season (1900), whereas that of Plot 'B' had been in crop. This would tend to give the former the larger amount of moisture. (See article on Conservation of Soil Moisture in report of this Division for 1900.)

We are not at present able to give any satisfactory explanation regarding one or two apparently abnormal results from this plot, as, for instance, on May 20 and August 26, when slightly more moisture was present in the soil under crop than in that under cultivation. These exceptional data are not, however, sufficiently numerous or marked to materially lessen the value of the experiment or cast doubt upon the correctness of the results in general.

This investigation has furnished corroborative evidence of an instructive and accurate character respecting the effectiveness of this system of cover crops and cultivation in the regulation of soil moisture. Much more, perhaps, could have been read into the results, but it was thought wiser to consider only their general trend, leaving until we make further research the discussion of points respecting which there is at present some obscurity.

The past season at Ottawa until the middle of August showed an ample and well distributed, though not excessive, rainfall. There was then a 'dry' month, followed by a fairly normal precipitation till the close of the experiment. It may be possible that the results would be different from those here recorded if obtained in a less favourable season. It will be desirable, therefore, to continue this investigation, extending its scope and making such changes in the plan of working as may be deemed from time to time advisable.

FERTILIZERS

MUCKS AND MUDS.

Owing to press of work in connection with special investigations, most of the samples of the naturally-occurring fertilizers received this year have been judged and

reported upon from a preliminary examination. Since the results so obtained are only partial in their character, they will not be inserted here, but we may include the data of a few samples of which a more complete examination has been made.

Swamp Muck.

Ontario, Algoma, Oxdrift P.O., forwarded by James Latimer :—

Analysis of (air-dried) Muck.

Moisture	8·01
Organic and volatile matter	27·62
Mineral matter, insoluble in acid	49·00
Mineral matter, soluble in acid	15·37
	100·00
Nitrogen, in organic matter	1·236

This muck, though somewhat below average quality, possesses a considerable fertilizing value and would prove useful for all classes of soils deficient in organic matter (humus) and nitrogen. If first composted with barn-yard manure, it should make a fertilizer of some worth for garden stuff, or for top dressing grass.

Prince Edward Island, Charlottetown.—Two samples of muck or peaty soils, forwarded by Mr. Franklyn Bovyer, with a request for information as to their relative value considered as soils, may be here reported upon.

Analyses of (air-dried) Mucks.

	No. 1.	No. 2.
Moisture	5·02	8·39
Organic and volatile matter	46·83	74·65
Mineral matter, clay, sand, &c	48·15	16·96
	100·00	100·00
Nitrogen, in organic matter	1·43	2·65

As a soil, we should expect No. 1 to be the better, since it contains a more suitable proportion of clay and sand for most crops than No. 2. It would probably more readily furnish available mineral constituents to the growing plants and, certainly, contains a sufficiency of nitrogen.

Considered from the standpoint of their nitrogen and humus, No. 2 is the better. This makes it more valuable for composting purposes.

Both samples are distinctly sour, and would in consequence, for the majority of crops, be improved by lime or wood ashes.

'Mud' from the Flats at Yarmouth, N.S.

Nova Scotia.—In the harbour of Yarmouth there is a vast deposit, concerning the nature of which and its fertilizing value information has been asked by several farmers in the neighbourhood of the town. Thus in writing under date of February 20, 1901, Mr. W. T. Sterritt, of Yarmouth, N.S., says : 'This accompanies a sample of 'flats mud,' of which our harbour is full. We request the favour of an analysis, and if it possesses any merit as a fertilizer, we should be glad to know it, for it can be easily obtained here in practically unlimited quantities. It has not, apparently, been used as a fertilizer, but there are many farmers here who are anxious to learn if it is worth applying.'

It is of a slatey-gray colour, very similar to clay in consistency when wet. On exposure to the air it dries into somewhat hard masses.

Analysis of (air-dried) Mud.

Moisture	2·06
Organic and volatile matter	4·86
Clay and sand (insoluble in acid)	83·44
Oxide of iron and alumina	5·92
Lime	1·02
Magnesia	·70
Potash	·01
Phosphoric acid	·19
Common salt	1·80
	100·00
Nitrogen, in organic matter	·215

The percentages of the essential elements of plant food—nitrogen, phosphoric acid, and potash—are so small that we should not feel justified in advising the use of this deposit as a fertilizer. It is quite possible that it might be applied beneficially to certain soils, but the advantage would be from its mechanical, rather than its manurial, effect.

The amounts of nitrogen and phosphoric acid are very similar to those found in fairly good soils, but the percentage of potash is extremely small. There is a notable, though not large, percentage of lime, which no doubt would give the deposit a value for soils deficient in this element. Owing to the, comparatively speaking, large amount of salt and the fact that the mud dried into hard lumps, we think its trial should be made with care and at first only on a limited scale.

MARL AND LIMESTONE.

There are many soils in Canada capable of improvement by the judicious use of lime. As this fact becomes better recognized we not only receive inquiries respecting the application of this amendment, but also many specimens of marl and limestone for report as to their lime-content. In districts where lime is scarce, or expensive by reason of long freightage, and deposits of marl (carbonate of lime) occur, this latter material may be advantageously employed as a source of lime, either as a direct application to the soil or after burning. Again, it frequently happens that neither lime nor marl is easily procurable, and then information is sought as to the character of the rock in the neighbourhood, with a view to the possible production of lime by burning.

The majority of the samples so received have been reported upon simply from a preliminary examination—this being considered to afford sufficient information for the purpose. A few of them, however, have, for special reasons, received a more or less complete analysis, and the results so obtained are here inserted.

Marl.

British Columbia.—A sample forwarded from Spallumcheen Valley, B.C., by Mr. Donald Graham, of Armstrong, furnished the following data:—

	p. c.
Insoluble rock matter	23·11
Carbonate of lime	52·68
Organic matter, oxide of iron, &c. (undetermined)	24·21
	100·00

This would yield, on burning, practically 30 per cent of lime, and consequently, if occurring in any quantity, would be valuable in those districts in which the soil needs this element of plant food.

It is found underlying muck, but the extent of the deposits in this district is not known to the writer.

Nova Scotia.—From Lower Settlement, South River, sent by Mr. James Dunn.

	p. c.
Insoluble rock matter	18·68
Carbonate of lime	69·46
Organic matter, oxide of iron, &c. (undetermined)	11·86
	100·00

This is a marl of very fair quality and would prove a valuable source of lime for all soils requiring this element. On burning, it would yield about 39 per cent of lime.

Limestone.

Quebec.—From Stornaway, Compton county, sent by Mr. E. M. Campbell, who writes: 'The soils of the farms in this vicinity would be greatly benefited by an application of lime. We shall be glad to learn if lime for such a purpose could be obtained by burning the rock, a sample of which I send you herewith.'

	p. c.
Insoluble rock matter	86.03
Carbonate of lime	3·19
Oxide of iron and alumina	9·78
Undetermined	1·00
	100·00

It is quite evident from these figures that this rock is not limestone, and would be valueless for the purpose of making lime.

From Labelle county, sent by Hon. Wm. Owens, Montebello. There are many stiff clay loams in this locality, which, it is presumed, would be improved, chemically and mechanically, by an application of lime. The analysis of two specimens of 'limestone rock' occurring in the district furnished the following results:—

	Light Specimen. Per cent.	Dark Specimen. Per cent.
Insoluble rock matter	29·70	36·20
Carbonate of lime	60·75	54·55
Oxide of iron and alumina	5·40	5·70
Undetermined	4·15	3·55
	100·00	100·00

There is no great difference in value between the samples. The 'light' limestone would yield, completely burned, 34 per cent lime; the 'dark' limestone, 30 per cent lime. Though the resulting lime would be too poor for building purposes, it might be used to advantage agriculturally.

THOMAS' PHOSPHATE FLOUR (BASIC SLAG).

Under several names, Gilchrist Thomas Slag, Basic Slag, Thomas' Phosphate Flour, &c., a by-product of the Bessemer steel process, finds its way upon the market.

Its fertilizing value may be said to depend upon two factors : the percentage of phosphoric acid present, and the degree of fineness to which the slag has been ground. Although only introduced into Canada some three years ago, it is fast growing in favour, being found a useful source of phosphoric acid, more especially for sour soils, those rich in humus, and those deficient in lime.*

Basic slags, as might be expected, will vary in composition, but usually they contain between 15 per cent and 20 per cent of phosphoric acid, of which we have found about two-thirds is soluble in a 1 per cent solution of citric acid, and hence may be considered as more or less 'immediately available.' There is also present a certain amount of free lime, generally about 15 per cent, and it is this fact that gives the slag an additional value for soils of the character we have mentioned. With respect to the *fineness of grinding* already referred to, it has been ascertained that the solubility of the phosphoric acid, in other words, the activity of the fertilizer, is in proportion to the degree of fineness—the coarser the slag the slower does it set free its phosphoric acid for crop use.

To obtain data upon the degree of availability of its phosphoric acid, certain laboratory experiments were made upon a sample of 'Thomas' Phosphate Flour,' forwarded by a correspondent in Nova Scotia, in which province, as well as in New Brunswick, we learn this fertilizer has a large sale. It was in the form of a fine, almost impalpable powder.

The total phosphoric acid present was found to be 18·23 per cent.

Citric Acid, 1 per cent.—One gram of the fertilizer was shaken up with 100 c.c. of 1 per cent citric acid solution (a solvent presumed to be approximately equal to the exudations of roots in strength or power of rendering soluble mineral plant food) for two hours at ordinary temperatures and filtered. Analysis showed that 10·33 per cent phosphoric acid had entered into solution. In the next experiment 1 gram of the fertilizer was shaken up with 200 c.c. of the 1 per cent citric acid solution, time and temperature being the same as in the preceding trial. Phosphoric acid to the extent of 11·55 per cent had been dissolved.

Further investigation will be made to ascertain, if possible, the limit of solubility or availability, but these data are in themselves sufficient to indicate that a very large proportion of the phosphoric acid *may* be rendered assimilable during the first season of application. Further, it is evident that this fertilizer is not, as thought by some, to be considered in the same category, as regards availability, with 'phosphate rock,' 'floats,' &c., forms of phosphoric acid which can scarcely be used directly owing to their very slow solution in the soil.

In England and Germany, countries now using large quantities of this fertilizer (Basic slag), especially as a top dressing for grass lands, the relative value of a sample is determined by the amount of phosphoric acid soluble in a 2 per cent citric acid solution (Wagner's method). By this stronger solvent we obtained from the sample under consideration 12·77 per cent phosphoric acid.

WOOD-ASHES.

In the course of the examination of many soils from British Columbia, it has been made evident in a number of instances that it would be advisable to apply lime, either to supply a deficiency in this element of food, to serve as a correction for sourness or to aid in the conversion of certain injurious iron compounds found in badly drained lands. To this end we have advised the application of wood-ashes, which would not only furnish lime, but also notable amounts of those important constituents of plant food—potash and phosphoric acid—but to this suggestion we almost invariably receive the reply that such are not obtainable. The common and, indeed, almost universal impression among farmers of that province is that the soft woods, Douglas fir, cedar, &c., do not contain any mineral matter and produce no ash when burnt. There is no

*For a fuller account of this fertilizer, see report of this Division for 1898, p. 160.

doubt but that the percentage of ash in these woods is small, much less than in hard woods, but that there is not any ash is an error. The very 'light' character of the soft wood ashes, rendering them easy of dissipation by the wind, has, we think, materially assisted in this belief. It is our intention, therefore, when an opportunity permits, to ascertain the amount and composition of the ash in the various British Columbia woods grown on soils of various characters, but in the meantime it will be of interest to furnish the data from a sample of Douglas fir ashes forwarded from Kamloops, B.C., recently analysed in our laboratories. The correspondent sending the ashes says: 'The Douglas fir wood ashes I send are just as taken from the ash heap at the power house here. Kindly let me know if they contain any considerable amount of potash, and if they would be valuable as a fertilizer for an orchard soil.'

Our analysis furnished the following data:—

	p. c.
Moisture	·19
Organic and volatile matter	·90
Insoluble residue (clay, sand, &c.)	40·68
Oxide of iron and alumina	13·95
Lime	27·13
Potash	3·12
Phosphoric acid	1·84

Microscopic examination of the 'insoluble residue' revealed the presence of a considerable amount of quartz sand with a certain small proportion of clay. We may fairly presume, therefore, that the sample is not representative of the pure ash of the Douglas fir. Considered as a commercial sample of wood ashes, it may be noted that they are not of equal quality with hardwood ashes purchasable in eastern Canada, which contain, on an average, 5½ per cent of potash. They nevertheless possess a sufficiency of this element to give them a distinct value as a potassic fertilizer. And further, their lime content points to their usefulness for such soils as we have been considering. We would strongly advise farmers, and especially fruit growers, to procure when possible such ashes, feeling assured that it is only from soils comparatively rich in available mineral constituents that vigorous, healthy growth can be obtained.

TANNERY WASTE.

This material consists largely of 'fleshings' or scrapings from the hides after their maceration—the first step in the cleansing process of the hide at the tannery. When this waste is fairly free from hair, leather scraps and other similar substances that resist decay (as is usually the case), we may suppose it to furnish nitrogen that will, more or less readily become converted by nitrification (as for instance, by fermentation in the compost heap, or more slowly in the soil) into forms assimilable by plants. It is consequently to be considered a valuable nitrogenous fertilizer.

A correspondent in Oakville, Ont., forwarded a month ago a sample for examination. It was a reddish mass of the consistency of cheese, showing white spots or particles throughout and possessed of a most offensive smell. On analysis, we obtained the following data:—

Analysis of Tannery Waste.

Water	45·91
Organic matter	53·42
Ash or mineral matter	·67
	100·00
Nitrogen, in organic matter	3·23

Potash and phosphoric acid being practically absent, the fertilizing value of this substance depends on its percentage of nitrogen and the readiness with which this element might be liberated for plant use.

From what has already been said it might be inferred that the relative value or usefulness of nitrogen in various fertilizers differs greatly, according to its availability. Thus, the nitrogen of nitrate of soda is immediately usable by crops, and capable of giving a large increase in yield at once; it is consequently worth more, pound for pound, than the nitrogen in bone meal, which only becomes slowly available by the decay of the bone in the soil. The relative values or availability of the nitrogen in certain of the more important agricultural forms, as ascertained by vegetation tests, has been given, approximately, as follows:—

Nitrate of soda	100
Dried blood	70
Ground fish and flesh meal	65
Bone meal	60
Leather, wool, hair, horn and hoof	5 to 30

Presuming that all the nitrogen present exists as flesh, then we may assign to it a value equal to half of the value of nitrogen in nitrate of soda, but if there is any admixture of hair, leather, &c., then it might not be worth more than one-fourth that amount.

Leather waste and hair.—These, agriculturally speaking, are of very little value, owing to their power of resisting decay. Thus, though they may contain large amounts of nitrogen, this element is 'locked up' so securely as to be for a very long time quite useless to plants. Some authorities state that decomposition may be started and the nitrogen set free by composting the leather waste with actively fermenting dung, with urine or with strong alkalies, such as potash, but considering the refractory character of this material, the writer is of the opinion that nitrogen can be obtained cheaper, as from the clover crop, for instance. However, if it is wished to make a trial, a plan suggested would be to place the waste in alternate layers with good unleached wood ashes in a large vat, keeping the mass thoroughly moistened. At the expiration of several months the waste will be disintegrated and to a certain extent decomposed. A modification of this plan would be to pour a hot solution of lye over the waste and allow to remain for some time. Fertilizer manufacturers adopt the method of roasting the leather waste and heating with sulphuric acid (oil of vitriol) subsequently neutralizing the residue. This process is the most effective towards making the nitrogen assimilable, but unfortunately it is not practicable upon the farm, special apparatus and experience being required.

SEA-WEED.

Large quantities of sea-weed may be collected on both the eastern and western coasts of Canada, and hence farmers are constantly inquiring as to its fertilizing value and the best methods for its use.

In the report of this Division for 1894, we published the analysis of rock-weed (*Fucus furcatus*), obtained in January, at Smith's Cove, N.S. The data showed that it was to be considered as a valuable manure, on account of the potash and nitrogen it contained.

Composition of Rock-weed.

	p. c.
Water	63·49
Organic matter	27·93
Ash and mineral matter	8·58
	100·00

	Per cent.	Pounds per ton.
Nitrogen	·468	9·36
Potash	2·025	40·50
Phosphoric acid	·108	2·18

In September of the present year a sample of another variety of rock-weed (*Fucus vesiculosus*) was forwarded from St. Andrews, N.B. It was quite fresh when received, and was immediately analysed.

	p. c.
Water	79·23
Organic matter	15·23
Ash or mineral matter	5·54
	100·00

	Per cent.	Pounds per ton.
Nitrogen	·172	3·44
Potash	·76	15·20
Phosphoric acid	·04	·80

The fact that the sample analysed in 1894 contained less water (63·49 per cent) than the one examined this year will account, in part, for the present percentage of the fertilizing constituents being lower. It does not, however, entirely explain the differences that are to be noted, and we are unable to say whether such are in part due to inherent qualities of the two varieties or to the time of year (and consequently of growth) at which they were collected. Recent investigations conducted at the Rhode Island Experiment Station laboratories go to show that sea-weed gathered in the winter season are richer in fertilizing elements than those gathered in the summer.

The value of this essentially potash fertilizer is enhanced by the readiness with which this material decomposes in the soil, liberating the same season much of its plant food in assimilable forms. It answers best on warm, moist, porous soils, and may be lightly ploughed or harrowed under to the extent of 20 to 30 tons per acre. If it is inconvenient to apply the sea-weed at once to the soil it may be composted, care being taken that the potash is not lost by leaching rains.

Eel Grass (*Zostera marina*).

This marine plant grows freely and in large quantities in the shallow waters along the north shores of Nova Scotia and New Brunswick, and in the estuaries and bays of Prince Edward Island. It is generally considered to have little or no fertilizing value, and this opinion no doubt results from the fact that it is extremely difficult to rot it, either in the soil or in the compost heap. Nevertheless it contains notable amounts of plant food, as will be apparent from the subjoined analysis. Its chief uses at present are for mulching and as a material for banking up houses, barns, &c., in the autumn to keep out the frost.

In the year 1891, a sample of eel grass that had been dried at a gentle heat was forwarded from Haliburton Bridge, N.S., to the laboratories, and yielded the following data:—

	p. c.
Nitrogen, in organic matter	1·24
Ash or mineral matter	21·90
Phosphoric acid (in ash, 1·80 per cent)	·41
Potash (in ash, 13·28 per cent)	2·90

In December, 1900, we received from Mr. D. J. Stewart, Aitkens Ferry, P.E.I., two samples, of which he writes as follows:—'No. 1 is the fresh green Eel grass, in

long pieces. No. 2 is in short, broken up pieces which come ashore in large quantities in the autumn. We should like to know their relative value as regards plant food. Most farmers in this section consider the short, brown material of little or no value, and it is possible that it has lost some of its potash by being so long in the salt water. If of equal value, weight for weight, it would be more economical to haul the short stuff. Further, the latter mixes better with stable manure than the fresh green Eel grass. After cleaning out the cow stable we place a layer of the short grass in the gutter as an absorbent and we have had good results by having as much as half the bulk of manure of Eel grass. However, it is as a summer mulch for strawberries that I have used the largest quantity of this short material, and find it for this purpose much better than cut straw, which, as you know, gets wet and mildews and is apt to induce decay in the berries. This short sea-weed never mildews and the berries resting upon it remain sound.'

Our analyses of these two samples are as follows:—

	Fresh material, in long pieces.	Short, brown, old material.
Water	74·05	84·81
Ash or mineral matter	7·16	4·81
Ash, insoluble in acid	·91	1·43
Phosphoric acid	·11	·05
Potash	·87	·05
Nitrogen, in organic matter	·42	·17

It is evident from these data that, weight for weight, the fresh Eel grass contains much the larger percentage of plant food. The short, brown material has lost half of its phosphoric acid, about nine-tenths of its potash, and somewhat more than half its nitrogen. As to the relative availability of these constituents in the two samples, it is impossible to speak with certainty, but possibly the short, brown Eel grass may have the advantage in this respect.

There is no doubt that the application of Eel grass directly to the soil would be of little value, owing to its strong resistance to decay, but first air-dried and used as an absorbent material in the stable, or composted, we think its fertilizing constituents could in a large measure be made available.

FODDERS AND FEEDING STUFFS.

ROOTS.

In the report for 1900 we furnished information respecting the comparative feeding value of certain roots, as ascertained by chemical analysis on the crop of that year. To learn how far the character of the season or other possible factors might affect the composition of these roots, as well as to obtain data that could be used in compounding rations for steers under experiment during the coming winter, we have submitted to analysis specimens from the crop of 1901 grown on the Central Experimental Farm.

Time did not permit us to make complete analyses. We, therefore, determined the percentage of dry matter and the percentage of sugar (in juice), these being the two most important data from the feeding standpoint. The amount of true protein in roots is very small, and fat exists practically in traces, so that in the results here given we have all the necessary figures upon which to base a judgment as to the nutritive value of the roots.

ANALYSIS of Roots, Central Experimental Farm, Ottawa, 1901.

Number.	Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of one Root. Lbs.	Oz.
1	Gate Post Mangel	90·59	9·41	4·15	2	9
2	Golden Fleshed Tankard Mangel	90·37	9·63	5·02	2	7
3	Giant Yellow Globe Mangel	90·90	9·10	4·80	3	3
4	Short White Improved Carrot	89·78	10·22	4·63	1	9
5	Intermediate Short White Carrot	90·51	9·49	4·40	2	3
6	Danish Improved Sugar Beet, ordinary culture	81·47	18·53	11·87	2	1
7	" " " (another sample).	83·16	16·84	11·49	3	6
8	" " special culture	80·61	19·39	11·28	1	11
9	" " " (another sample).	81·50	18·50	12·00	1	7
10	Half Sugar Rosy Mangel (Vilmorin)	.....	.....	7·38	2	4
11	Half Sugar White Mangel (Vilmorin)	.....	.....	6·47	2	5
12	Vilmorin's Improved Sugar Beet	.....	.....	14·08	1	10
13	Danish Red Top Sugar Beet	.....	.....	10·54	1	12
14	Danish Improved "	.....	.....	15·47	1	9
15	Red Top Sugar "	.....	.....	8·89	1	15
16	Royal Giant "	.....	.....	7·88	1	15
17	Klein Wanzleben "	.....	.....	14·91	1	6
18	Improved Imperial "	.....	.....	9·80	2	0

MANGELS.

It will be evident on comparing the present results with those recorded last year that the composition of any particular variety is by no means constant. The factors that control this susceptibility to change are possibly three: the seed, the soil, and the season. The size of the root, however, has also been shown to be a matter of importance—the larger roots being usually found to contain somewhat the less dry matter, and, therefore, compared weight for weight with smaller roots of the same variety, to be of less feeding value. As the roots this year selected for analysis were slightly smaller than those of last season, this cause cannot be advanced to explain the lower percentages of dry matter which is observable in many of the examples.

The results of the three varieties of mangels—Gate Post, Golden Fleshed Tankard, and Giant Yellow Globe—gave an average last year of 9·86 per cent dry matter, and 4·52 per cent of sugar in juice; this season we obtained 9·04 per cent and 4·65 per cent respectively, for these constituents. Taking the average data of a class of roots, therefore, the variations are not large, though there may be considerable differences between the roots of any one variety, from year to year.

SUGAR BEETS.

The 'Danish Improved' was the sugar beet grown both seasons under 'ordinary' and 'special' culture in the field to ascertain the effect of earthing upon the relative feeding value. Our results for the dry matter and sugar are:—

	1900.		1901.	
	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.
Ordinary culture	20·35	16·43	17·68	12·68
Special culture	21·49	16·98	18·54	12·94

With regard to this variety, we have observed that of all the sugar beets grown during the past two seasons on the Central Farm it showed the least tendency to grow above the surface of the soil, and consequently required least earthing up. Indeed, very little difference could be detected between the roots earthed up and those grown under ordinary field culture, and the analytical data confirm this observation. For this reason we are of the opinion that it would be a desirable variety to grow where the crop is intended for feeding purposes.

Sugar beets Nos. 12 to 18, inclusive, did not receive special culture, being simply grown in test plots to obtain the yields per acre. We notice that the Danish Improved stands highest in sugar content, corroborating the statement just made regarding this variety. The Klein Wanzleben and Vilmorin's Improved stand next in order of merit. No doubt, under special culture for factory purposes, the majority of these varieties would have shown a much higher percentage of sugar, but the present results are of interest in showing their relative merit in sugar production when treated as ordinary field roots.

Mangels with a high sugar percentage.

We would call special attention to the two mangels, Half Sugar Rosy and Half Sugar White (Nos. 10 and 11), from seed produced and kindly furnished by Messrs. Vilmorin, of Paris, France. The sugar content is remarkably high for mangels, clearly indicating their importance for feeding purposes. We have in them an excellent example of the scope and value of special breeding and selection with a definite end in view, the Messrs. Vilmorin having for some years been engaged in developing a mangel with a high sugar percentage.

Sugar content in lower and upper parts of roots.

To furnish experimental proof of the statement regarding mangels that has several times been made respecting sugar beets, viz., that the part of the root beneath the soil contains more sugar, and hence has a higher feeding value than the portion above ground, we made an analysis of six roots each of Gate Post and Giant Yellow Globe mangels, estimating the sugar in the upper and lower parts of the roots. The following statement gives our results:—

Variety of Mangel.	Percentage of Sugar.
Giant Yellow Globe Mangel—part below ground	5·08
" " part above ground	4·54
Gate Post Mangel—part below ground	4·75
" part above ground	4·12

A consideration of the fact that sugar is the chief constituent of value in roots might lead us to infer, in the light of this experiment, that a system of culture which tends to keep the roots fairly well earthed up is one that will result in the most nutritious crop. Further, those varieties which naturally tend to grow beneath the soil, providing they furnish an adequate yield per acre, will be the most profitable to grow.

SESSIONAL PAPER No. 16

ON THE CHANGES IN THE COMPOSITION OF ROOTS DURING STORAGE.

There is an impression among many stock feeders of experience that the feeding qualities of ordinary farm roots improve with storage. This opinion, however, is not generally held, and it was, therefore, to obtain further information regarding possible changes in the composition of roots during storage in a root cellar, that analyses were made from time to time (from October, 1900, to March, 1901) of several varieties from the crop of 1900. The roots examined included three varieties of mangels, two of carrots, and one each of turnips and sugar beets. About two bushels of each variety were selected—roots of typical size and shape only being taken—and placed in bags which were throughout the investigation kept buried in a large heap of roots in the cellar. By this means the conditions of storage obtained were similar in all respects to those ordinarily prevailing in good root cellars. On March 15, the last date of analysis, the roots remaining were all sound and in good condition. The sample for analysis in each instance consisted of six roots.

Before discussing the results of the present investigation, however, it may be profitable to consider certain facts regarding this problem that have been recently brought to light by the researches of other investigators. In 1898, Wood showed the nitrates present in the juice of the mangels, as pulled, decreased in amount to the extent, approximately, of one-half by January 15. 'These nitrates, he states, 'are liable to cause derangement in digestion; by January these nitrates have been changed into amides which have some feeding value and are quite harmless.'* The probability is that under systems of manuring as practised in Canada, nitrate of soda or sulphate of ammonia not being extensively used, the proportion of nitrogen in the freshly pulled root present in the form of nitrates is not so large as that in roots from highly fertilized fields, as in England. Nevertheless, this discovery is an important one as showing the trend of change in certain of the nitrogenous compounds of roots.

In an exceedingly able and exhaustive paper on this subject, Dr. A. H. J. Miller,† after quoting results obtained by the late Dr. Voelcker, to the effect that stored roots undergo considerable change, chiefly by loss of sugar and allied bodies, and possibly also of nitrogenous compounds, due to a process of slow combustion, gives in detail the data of an interesting series of experiments conducted by himself on mangels grown with and without nitrate of soda at Rothamsted. After tabulating the results from mangels receiving no nitrate, Dr. Miller concludes: 'No essential change (except in total weight, evidently due to loss of water) took place up to the end of March. During the next three months (*i.e.*, till the end of June), however, there was a considerable loss of dry matter, much of which was due to destruction of sugar, whilst about half the cane sugar was inverted.' By June 20, about 14 per cent of the total sugar originally present had disappeared, but the loss in non-nitrogenous matter other than sugar exceeded this amount. The examination of mangels that in addition to other manure had received 550 pounds of nitrate of soda per acre showed 'a regular decrease both of dry matter and of sugar. Even by the end of March the loss of sugar was considerable, and a good deal inverted.' After discussing the probable loss in sugar per acre of roots by storage until the end of June, he says: 'Taking into account the variety of conditions which presumably affect the changes undergone by stored roots, any conclusions drawn from the results can only be given with some reserve. It seems, however, very probable that a considerable loss of the most important constituent, sugar, and of other constituents, does frequently take place. That nitrate of soda increased the loss of sugar, if not of other constituents, seems to be highly probable, since the two lots of roots were kept together

*Changes in Mangels during storage, T. B. Wood, Journal R.A.S.E., 3rd series, Vol. IX., part III.

†Experiments at Rothamsted on the changes in the composition of mangels during storage, A. H. Miller, Journal R.A.S.E., 3rd series, Vol. XI., part I.

under exactly the same conditions.' He further adds: 'Increased digestibility after a lengthened period is conceivable, and might be due to a partial breaking down of the crude fibre,' but 'in view of, however, the small amount of crude fibre in roots, a change of this kind would seem to be of doubtful value, and any gain in digestibility, if it takes place, may be a good deal more than counterbalanced by the losses to which we have called attention.'

The practical suggestions for the Canadian farmer that seemed to be called forth by this important work are that the temperature of the root cellar should be kept as cold as possible—but not reaching the freezing point—and that the cellar should have good ventilation. Under such conditions the process of slow combustion that causes the loss of sugar will be retarded.

Our own investigation had for its chief object the tracing of the albuminoids during storage, it being thought that as spring approached these would be converted into amides or other nitrogenous compounds of less feeding value.

Dry Matter in Roots during Storage.—In table I. the percentages of water and dry matter for the several roots are given as determined when the roots were freshly pulled (October), in January and in March of the following year. The most obvious and remarkable feature of these data is their uniformity for each variety of root, showing, as they do, that throughout the period of storage the ratio of dry matter to water-content remained practically the same. Such differences as do occur are not greater than would have been obtained from the examination of individual roots. There had evidently been no 'drying out' of the roots.

While it is impossible to state absolutely from these results that until March 15 there had been no loss in total weight, we may fairly infer that such loss, if any, can not have been large. It is satisfactory, therefore, to note that the conditions of storage were in such a large measure conducive to the preservation of the roots. If we were to estimate feeding value simply by percentage of dry matter, then, weight for weight, the roots in March are as nutritious as they were in the October previous.

Nitrogen in Dry Matter.—Determinations of the total, albuminoid and non-albuminoid nitrogen were made on the roots in October, January and March, and the results calculated upon the dry matter. These are presented in table II.

Total Nitrogen.—In five of the seven instances cited, the nitrogen is slightly higher in March than in October. This is evidently due to the destruction by slow combustion of a small amount of the non-nitrogenous organic matter, which would necessarily leave the dry matter rather richer in nitrogen. This, as we shall see later on from our results, does not mean necessarily that the dry matter is more nutritious in the roots stored until March. With two of the varieties there had been a small loss in total nitrogen. This may have resulted from differences in the individual roots examined, or to a direct loss of nitrogen by fermentative changes.

TABLE I.—Composition of Roots During Storage—1900-1901.

Date of Examination.	Gate Post Mangel		Giant Yellow Globe Mangel.		Golden Tankard Mangel.		Improved Short White Carrot.		Guérande or Ox-Heart Carrot.		Champion Purple Top Turnip.		Danish Improved Sugar Beet.	
	Water.	Dry Matter.	Water.	Dry Matter.	Water	Dry Matter.	Water.	Dry Matter.	Water.	Dry Matter.	Water.	Dry Matter.	Water.	Dry Matter.
October 27	88·86	11·14	91·82	8·18	89·75	10·25	91·54	8·46	88·36	11·64	89·23	10·77	78·51	21·49
January 15	88·87	11·13	92·34	7·66	91·15	8·85	89·49	10·51	89·55	10·45	89·85	10·15	79·58	20·42
March 15	89·92	10·08	90·54	9·46	90·94	9·06	90·27	9·73	89·35	10·65	88·91	11·09	78·98	21·02

TABLE II.—Nitrogen in Dry Matter in Roots, 1900-1901.

Date of Examination.	Gate Post Mangel.			Giant Yellow Globe Mangel.			Golden Tankard Mangel.			Improved Short White Carrot.			Guérande or Ox-Heart Carrot.			Champion Purple Top Turnip.			Danish Improved Sugar Beet.		
	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.	Total Nitrogen.	Albuminoid Nitrogen.	Non-Albuminoid Nitrogen.
October 27	1·17	·75	·42	2·43	1·19	1·24	1·28	·84	·44	1·58	1·02	·56	1·53	·91	·62	1·26	·91	·35	1·03	·52	·51
January 15	1·03	·59	·44	2·16	·85	1·31	1·55	·79	·76	1·43	·74	·69	1·62	·75	·87	1·63	·86	77	1·01	·44	·57
March 15	1·39	·75	·64	1·72	·64	1·08	1·95	·82	1·13	1·54	·79	·75	1·76	·84	·92	1·76	·96	·80	1·14	·54	·60

The Albuminoid and Non-albuminoid Nitrogen.—The percentage of albuminoid nitrogen (which, as we have said, has the greater feeding value) appears to remain fairly constant in the dry matter throughout the period of storage, though in the case of two of the roots, Giant Yellow Globe mangel, and Improved Short White carrot, there had been a notable decrease, due probably, in part at least, to the breaking down of the albuminoids. Since, as we have seen, the percentage of total nitrogen (calculated on the dry matter) in the majority of the examples increased somewhat during storage, it necessarily follows that the percentage of non-albuminoid nitrogen has slightly increased. This is the case in each class of roots, as will be observed by reference to table II. It is perhaps the most noticeable fact brought out by this investigation.

TABLE III.—Ratio of Albuminoid to Non-albuminoid Nitrogen in Roots.

Date of Examination.	Gate Post Mangel.	Giant Yellow Globe Mangel.	Golden Tankard Mangel.	Improved Short White Carrot.	Guérande or Ox Heart Carrot.	Champion Purple Top Turnip.	Danish Improved Sugar Beet.
October 27	1:0·56	1:1·04	1:0·52	1:0·55	1:0·68	1:0·38	1:0·98
January 15	1:0·74	1:1·54	1:0·96	1:0·93	1:1·16	1:0·89	1:1·27
March 15	1:0·85	1:1·68	1:1·38	1:0·95	1:1·09	1:0·83	1:1·11

The non-albuminoid nitrogen includes that present in amides and other compounds of inferior feeding value. We may, therefore, assume that provided the percentage of total nitrogen in the dry matter does not decrease, then the feeding properties of that dry matter, as far as nitrogenous compounds are concerned, will depend upon the relative proportion of the albuminoid to the non-albuminoid nitrogen. In table III. we have given this ratio (calculated from the data of table II.), which, it will be observed, in all the roots save the sugar beets increases markedly during the storage period.

From the foregoing statements and data we may infer (1) that nitrates, resulting more particularly from high manuring with soluble nitrogenous fertilizers, and which are more or less injurious to the animal, tend to disappear on storage of the roots; (2) that there is a tendency to fermentative changes during storage that lead chiefly to the destruction of the sugar—the most important nutrient of roots. This deterioration may no doubt in a large measure be controlled by low temperature and good ventilation ; under such conditions, we imagine the loss does not assume in our winter climate any grave proportions. It would no doubt be found to increase markedly after March. Further, (3), that the non-albuminoid nitrogenous componds increase, as a rule, with storage and especially so during the spring months.

It is possible, as pointed out by Miller, that the digestibility of the roots may slightly increase with storage—but this at best can only be a small gain—and, therefore, apart from the question of nitrates, there is no considerable improvement in the quality of roots by storage, as thought by some, but rather a tendency to loss, as evidenced by destruction of the sugar and the formation of non-albuminoid compounds.

Sugar Beets.

The sugar beets examined and here reported upon comprise samples from Strathcona, N.W.T., Winnipeg, Man., and Prince Edward Island.

North-west Territories.—Strathcona, Alta.

These samples were forwarded by Mr. Nelson D. Mills, Strathcona, who in sending the particulars of growth (October 1) writes: 'These beets were sown very late, and came through two hailstorms of unusual severity. In addition to this there have been severe white frosts during the last two weeks, so that if they show a proper percentage of sugar, then no weather that Alberta has in store can interfere with beet raising. I may add that none of the beets had special attention as to tillage, such as deep ploughing and cultivating to kill weeds, &c.'

The particulars of growth as furnished by Mr. Mills are given in table I.; the analytical data in table II.

Table I.—Sugar Beets—Strathcona, N.W.T., 1901.

Number.	Name.	Address.	Variety of Beets.	Dates.		Distance between		
				Sowing.	Pulling.	Rows.	Plants in Rows.	
						Inch.	Inch.	
1	William Place.	S.W. ¼ Sec. 11, Tp. 52, R. 24, 4 miles from Strathcona.....	Klein Wanzleben	June 15.	Sept. 30.	24	8	Black loam, clay subsoil.
2	Thos. Rooney.	2 miles south of Strathcona.....	" "	May 22.	Oct. 1..	24	6	Black loam, unmanured.
3	James Pithie..	Salisbury, Alta.....	" "	May 29.	Oct. 2..	30	10	Sandy loam, unmanured.

Table II.—Analysis of Sugar Beets from Strathcona, N.W.T., 1901.

Number.	Variety.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
1	Klein Wanzleben.....	15·01	17·95	84·73	1	1
2	" "	12·84	16·20	79·26	1	2
3	" "	14·02	17·20	81·51		13

Both as regards sugar-content and degree of purity, our data are indicative of excellent quality, and these beets would be considered as quite satisfactory for sugar extraction. In our report for 1900 we gave the analytical data from two samples of sugar beets grown in the Lethbridge district. These also indicated that beets with good sugar-content could be grown in Alberta, and it would, therefore, seem advisable, if sugar manufacture is seriously contemplated, to make a more complete test, growing the beets from the best seed, on larger areas and with strict attention to proper culture. The number of samples hitherto examined is too small for safe deductions as to the general suitability of Alberta for beet sugar production, but certainly the results so far obtained are of a promising character.

TABLE III.—Sugar Beets, Manitoba, 1901.

No. on bag	Name of Grower.	Address.	Variety of Beet.	Dates.			Distance Between.		Remarks.
				Sowing.	Thinning.	Pulling.	Rows.	Plants in Rows.	
							Inches.	Inches.	
1	D. McKee	Winnipeg	Vilmorin's Impd	June 1	July 4	Oct. 7			Heavy black soil with alkali.
2	"	"	Klein Wanzleben, Impd.	June 1	July 4	Oct. 7			" "
3	D. de Graaf	Louise Bridge	Klein Wanzleben	June 8	July 9	Oct. 8	16	8	Heavy black soil.
4	"	"	Vilmorin's Impd	June 8	July 9	Oct. 8	16	8	
5	John P. Haarsma	"	Vilmorin's Impd	June 10	July 8	Oct. 10			Black soil with a little sand, on river bank.
6	"	"	Klein Wanzleben, Impd.	June 10	July 8	Oct. 10			
7	R. de Vries	"	Klein Wanzleben, Impd.	June 1	July 2	Oct. 9	16	8	Heavy black soil.
8	"	"	Vilmorin's Impd	June 1	July 2	Oct. 9	16	8	
9	Hugh McKay	Fernton	Klein Wanzleben, Impd.	June 13	July 4	Oct. 8	16	8	Black soil with a little sand, on river bank.
10	"	"	New Danish, Impd.	June 13	July 4	Oct. 8	16	8	
11	A. Hutchings	Winnipeg	New Danish, Impd	June 16	July 2	Oct. 10	16	8	Light sandy soil, on river bank.
12	"	"	Klein Wanzleben, Impd.	June 17	July 2	Oct. 10	16	8	" " "
13	J. C. Sproule	Kildonan	Klein Wanzleben, Impd.	June 1	July 3	Oct. 1	24	12	Black soil, on river bank.
14	"	"	Vilmorin's Impd	June 1	July 3	Oct. 1	24	12	" "
15	J. B. Gowanlock	Neepawa		May 21		Sept. 26			Heavy sandy loam.

Manitoba.—At the request of the Department of Agriculture for the province, a further examination of sugar beets grown in the Red River valley in the vicinity of Winnipeg, has been made. The beets were received in excellent condition. Mr. Hugh McKellar, Chief Clerk, Department of Agriculture, Winnipeg, in furnishing the cultural data says: 'In a general way, the season was not considered favourable, there being too much rain.' In the foregoing tabular statement are given the varieties of seed used, the names of the growers, and other information respecting the beets, as furnished by Mr. McKellar.

The data for sugar-content and purity indicate, we regret to say, in by far the larger number of instances, beets too poor for profitable manufacture.

The appearance of the beets in several of the samples showed that the roots had not been kept earthed up. This fact, no doubt, accounts in part for the low results, and a further cause may be found in the unfavourable weather of the past year.

TABLE IV.—Analysis of Sugar Beets from Manitoba, 1901.

No.	Variety.	Percentage of Sugar in Juice	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
1	Vilmorin's Improved	10·03	15·27	65·68	1	12
2	Klein Wanzleben	9·52	14·64	65·02	1	8
3	"	10·70	15·01	71·28	1	9
4	Vilmorin's Improved	9·67	14·24	67·90	2	1
5	"	11·29	15·51	72·79	1	13
6	Klein Wanzleben Improved	10·88	15·91	68·38	1	12
7	" "	9·83	15·34	64·08	1	10
8	Vilmorin's Improved	7·85	12·50	62·80	1	15
9	Klein Wanzleben Improved	13·08	16·59	78·84	1	5
10	New Danish Improved	11·15	14·88	74·93	1	6
11	" "	10·29	14·46	76·00	1	3
12	Klein Wanzleben Improved	8·65	12·26	70·55	1	2
13	" "	9·76	14·56	67·03	2	0
14	Vilmorin's Improved	7·53	11·16	67·47	1	10
15		2·36	6·19	38·12	2	3

Though the results, both this year and last, are far from encouraging and certainly give but little promise of successful beet culture in the Red River valley, it is possible that the exceptional character of the season and neglect of special culture may in a large measure be answerable for the low averages obtained.

Sample 15, in our opinion, is not a sugar beet. In appearance it resembles the Golden Tankard, or possibly the Giant Yellow Globe mangel, and its sugar content conforms closely to that of these roots.

Prince Edward Island.—In the report of this Division for 1900 will be found the analyses of six samples of sugar beets grown in this province. This year we present data of seven samples forwarded by Mr. Callaghan, of Charlottetown, respecting which we are informed the seed was sown between May 15 and June 1, and the roots pulled between October 15 and 20.

TABLE V.—ANALYSIS of Sugar Beets from Prince Edward Island, 1901

No.	Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.	
						Lbs.	Oz.
1	Not stated.....	.....	9·03	13·63	66·25	5	6
2	"	Ellerslie, Prince Co.....	13·98	18·69	74·79	2	..
3	"	West River, Queen's Co...	12·54	17·09	73·37	3	13
4	"	Alberton, Prince Co	10·87	15·59	69·72	2	7
5	"	Charlottetown Royalty....	11·51	16·29	70·65	2	8
6	"	Freeland, Prince Co	11·62	16 49	70·47	2	5
7	"	Kensington, Prince Co....	11·96	17·13	69·81	2	8

These results are not so favourable as those of 1900, due very largely, we think, to improper or rather neglectful culture. The roots had not for the most part been 'earthed' and, as will be seen from the last column of the table, exceed the average weight necessary for a profitable sugar-content.

THE YIELD OF CLOVER AND ALFALFA FROM TWO AND FOUR CUTTINGS RESPECTIVELY.

The question of the relative value of the yield obtained from two cuttings as against that from four cuttings during the season has arisen in connection with the growth of clover and alfalfa. It was in order to gain some knowledge regarding this matter which might prove useful to those employing these plants, both as 'cover' crops and for 'soiling,' that the following investigation was made during the past season.

CLOVER.

A plot, one-twentieth acre, of common red clover in its second year of growth was selected. The clover had been sown in 1900 with grain. The plot was divided diagonally in order to insure greater uniformity, the north side being reserved for the four cuttings and the south side for the two cuttings. The intention was to cut the north side when about to flower, but showing no bloom, and the south side when it was considered in the right condition for cutting for hay.

North Side—Four Cuttings.—The first cutting was made on June 4, 1901, the average height of the clover being 25 inches and the plants about to flower—only two blooms being observed in the whole plot. After the plot had been carefully cut the crop was collected, weighed, and taken to the laboratory for analysis. The weights of fresh material, of the dry matter and crude protein, calculated per acre, are stated in table I.

The second cutting was taken on July 15, which was probably four or five days later than the time intended, as the crop was then found to be in full bloom. The average height was 22 inches.

The third cutting, August 15, showed that in the past month the clover had made an average growth of 8 inches. Many of the plants were in bloom.

The fourth cutting, September 18, indicated a sparse growth—in weight approximately one-half of the third cutting, though the average height of the plants was greater, viz., 13 inches. About one-tenth of the plants were in bloom.

South Side—Two Cuttings.—This half of the plot was in full bloom at the time of the first cutting, June 20, the average height of the plants being 30 inches.

The second cutting was made just one month later, July 20, the clover being again in full bloom, but with some heads withered. The condition of the crop was considered excellent for hay making.

Comparative Yields from Two and Four Cuttings.

The yields from the north side and south side and their food value may now be compared:—

Clover.	Weight of Crop per acre.	Weight of Dry Matter per acre.	Weight of Crude Protein per acre.
	Lbs.	Lbs.	Lbs.
North side (four cuttings)	8,965	1,703	333
South side (two cuttings)	6,900	1,445	234

From these data, it will be observed, there was obtained for the extra labour expended in two additional cuttings 258 pounds more dry matter per acre, which contained 104 pounds more crude protein than in the yield from two cuttings. We are of the opinion from a consideration of the whole experiment that the difference in yield between the two methods (though most probably always in favour of the more frequent cutting) will depend to a large degree on the stage of growth when the cuttings are made, and the time and amount of rain-fall throughout the season. With regard to the former, it is no doubt true that if the plant once forms its seed there will not be the subsequent effort to vegetative growth that there would be if the cutting were made previous to that period; and respecting the latter point, we know that clover being a moisture-loving plant a period of drought after cutting will greatly retard its future growth.

The results of this investigation can scarcely be interpreted as justifying the practice of four cuttings when the crop is to be made into hay, for we think that the extra weight and value obtained would be more than offset by the additional labour involved and the increased difficulty encountered in the drying and curing of the clover, which would contain practically about 5 per cent more moisture than if allowed to come to the period at which it is usually cut for hay. On the other hand, when the crop is intended to enrich the soil or for 'soiling' purposes the data may be taken to indicate that the more frequent cutting of the clover will prove the more advantageous, as yielding the greater amount of material that can be used either as a fertilizer or for feeding in the fresh condition.

Weights and Composition of Dry Matter in Crops of Various Cuttings.

South Side, Two Cuttings.—Compared, weight for weight, the crop of the second cutting (July 20) of the south side is worth more than that of the first cutting (June 20), from the fact that it is richer in dry matter and albuminoids. Thus we have the following data for one ton of each cutting:—

CLOVER (Two Cuttings), Dry Matter and Albuminoids per ton in fresh Material.

South Side.	Dry Matter, Per Ton.	Albuminoids, Per Ton.
	Lbs.	Lbs.
First cutting, June 20, in full bloom	405	52
Second cutting, July 20, in full bloom ; some heads withered	470	73

The dry matter as regards the relative proportion of albuminoid and non-albuminoid compounds is somewhat more valuable at the time of the second cutting, as is evident from the subjoined data:—

CLOVER (Two Cuttings), percentages of Albuminoids and Non-albuminoids in Dry Matter.

South Side.	Albuminoids.	Non-Albuminoids.
First cutting, June 20, in full bloom	12·9	2·7
Second cutting, July 20, in full bloom ; some heads withered	15·7	2·5

North Side, Four Cuttings.—Pursuing the same examination as for the south side, and first, comparing the weights of dry matter and albuminoids per ton in the crops of the four cuttings, we obtain the following interesting figures :—

CLOVER (Four Cuttings), Dry Matter and Albuminoids per ton in fresh Material.

North Side.	Dry Matter, Per Ton.	Albuminoids, Per Ton.
	Lbs.	Lbs.
First cutting, June 4, about to flower	346	50
Second cutting, July 15, in full bloom	464	67
Third cutting, August 15, about one-third in bloom	383	66
Fourth cutting, September 18, about one-tenth in bloom	498	83

As with the crop from the south side, the trend of the results shows an improvement in quality of the fresh material, both in dry matter and true albuminoids as the season advances. One ton of the fresh material from the fourth cutting has the feeding equivalent of 1½ to 1¾ tons of that from the first cutting.

The distribution of the nitrogenous compounds in the various cuttings is made evident by the following tabular statement:—

CLOVER (Four cuttings), percentages of Albuminoids and Non-albuminoids in Dry Matter.

Clover.	Albuminoids.	Non-Albuminoids.
First cutting, June 4, about to flower	14·7	5·8
Second cutting, July 15, in full bloom	14·4	5·5
Third cutting, August 15, about one-third in bloom	17·3	3·6
Fourth cutting, September 18, about one-tenth in bloom	16·7	2·4

The increase in the albuminoids and the decrease in the non-albuminoids clearly indicate the greater feeding value of the dry matter in the crop of the two last cuttings. The similarity in composition, in respect to these compounds, of the dry matter of the first and second cuttings is marked, and the same feature is noticeable in the case of the third and fourth cuttings.

After a consideration of the amount of dry matter, that of the true albuminoids is of first importance from the feeding standpoint. We, therefore, have constructed the following tabular scheme to show the amounts of these flesh-forming constituents per acre as obtained from the data of the two plans of cutting, given in tables I. and II.:—

CLOVER—ALBUMINOIDS—Pounds per Acre.

	South Side (two cuttings).	North Side (four cuttings).
First cutting	143	156
Second "	53	64
Third "		20
Fourth "		13
Total	196	253

These corroborate the inference already made, that the greater amount of food constituents was produced by the clover that had been cut four times in the season.

TABLE I.—Clover and Alfalfa Experiment, 1901.
Weight of Crop, Dry Matter and Protein, per Acre.

DATE OF CUTTING.	COMMON RED CLOVER.						ALFALFA.					
	South Side (two cuttings).			North Side (four cuttings).			South Side (two cuttings).			North Side (four cuttings).		
	Weight of Crop.	Dry Matter.	Crude Protein.	Weight of Crop.	Dry Matter.	Crude Protein.	Weight of Crop.	Dry Matter.	Crude Protein.	Weight of Crop.	Dry Matter.	Crude Protein.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
June 4				6,125	1,062	217				3,230	653	131
" 20	5,460	1,107	173									
" 21							6,490	1,574	257			
July 15				1,920	446	82				2,240	610	92
" 20	1,440	338	61									
Aug. 1							2,080	611	96			
" 15				600	115	24						
" 19										2,780	582	117
Sept. 18				320	80	15				1,440	292	74
Total	6,900	1,445	234	8,965	1,703	338	8,480	2,185	353	9,690	2,137	414

TABLE II.—Clover and Alfalfa Experiment, 1901—Composition of Fresh Material.

Date of Cutting.	Common Red Clover.								Alfalfa.							
	South Side. (Two Cuttings.)				North Side. (Four Cuttings.)				South Side. (Two Cuttings.)				North Side. (Four Cuttings.)			
	Moisture.	Dry Matter.	Albuminoid Nitrogen.	Non-albuminoid Nitrogen.	Moisture.	Dry Matter.	Albuminoid Nitrogen.	Non-albuminoid Nitrogen.	Moisture.	Dry Matter.	Albuminoid Nitrogen.	Non-albuminoid Nitrogen.	Moisture.	Dry Matter.	Albuminoid Nitrogen.	Non-albuminoid Nitrogen.
June 4	.....	.....	....	.....	82·67	17·33	·407	·160	.....	.....	.....	.....	79·80	20·20	·366	·280
" 20	79·73	20·27	·418	·089	.....	.....	....	.....	.....	.....	....	....	.....	.....	.....	.....
" 21	.....	.....	.....	.....	.....	.....	.....	.....	75·40	24·60	·391	·251	.....	.....	.....	.....
July 15	.....	.....	.....	.....	76·79	23·21	·536	·204	.....	.....	.....	.....	72·79	27·21	·531	·127
" 20	76·51	23·49	·590	·096	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aug. 1	.....	.....	....	....	.....	.....	.....	.....	70·61	29·39	·505	·233	.....	.....	.....	.....
" 15	.....	.....	.....	.....	80·83	19·17	·533	·109	.....	.....	.....	.....	.....	.....	.....	.....
" 19	.....	.....	....	.....	.....	.....	....	....	.....	.....	.....	.....	79·05	20·95	·478	·199
Sept. 18	.....	.....	.....	.....	75·08	24·92	·668	·095	.....	.....	.....	.....	79·72	20·28	·558	·261

ALFALFA.

The plot for this experiment was of the same size as that for the trial with clover, one-twentieth acre. Similarly, the north half was reserved for four cuttings, and the south side for two cuttings.

North Side—Four Cuttings.—The first cutting took place on June 4. The plants had an average height of 30 inches, and from appearance, were about one week from blooming.

Second cutting, July 15. Average height of plants 28 inches. About half the plants were in bloom.

Third cutting was made on August 19, when the average height of the alfalfa was 20 inches. No bloom showing.

The date of the fourth cutting was September 18. The average height of the crop was 20 inches, and none of the plants were in bloom.

South Side—Two Cuttings.—First cutting was taken June 21. Average height of plants 39 inches.

Second cutting, taken August 1. Average height 20 inches. About one-tenth of the plants in bloom.

Comparative Yields from Two and Four Cuttings.

The difference to be observed between the yields of fresh material per acre of the north and south sides, though still in favour of the former, is not so great as in the case of the clover. Further, though we notice a corresponding increase in the crude protein of the north half, more 'dry matter' by 50 pounds was obtained from the south half (two cuttings) of the plot.

Alfalfa.	Weight of Crop per acre.	Weight of Dry Matter per acre.	Weight of Crude Protein per acre.
	Lbs.	Lbs.	Lbs.
North side (four cuttings)	9,690	2,137	414
South side (two cuttings)	8,480	2,185	353

By a reference to table II. the explanation of the larger amount of dry matter from the two cuttings (south side) will be apparent. In the first, third, and fourth cuttings (north side) the alfalfa is seen to possess 79 per cent of water, whereas the crop from the south side (cut twice) never contained more than 75 per cent water. The averages of moisture-content and dry matter are as follows :—

	Moisture.	Dry Matter.
North side (four cuttings)	77·88	22·12
South side (two cuttings)	73·00	27·00

The more advanced stage of growth in the alfalfa of the south side plot when cut, fully accounts for the smaller percentage of water.

Weight and Composition of Dry Matter in Crops of Various Cuttings.

South Side—Two Cuttings.—Compared, weight for weight, the crops of the first and second cuttings, as regards dry matter and albuminoids, give data as follows:—

ALFALFA.—(Two Cuttings)—Dry Matter and Albuminoids per ton in fresh Material.

South side.	Dry Matter, per Ton.	Albuminoids, per Ton.
	Lbs.	Lbs.
First cutting (June 21)	492	49
Second cutting (Aug. 1)	588	63

As with the clover from the analogous plot, we have the greater feeding value per ton in the material from the second cutting.

The relative proportion of albuminoids to non-albuminoids in the dry matter of these cuttings is, similarly, seen to be in accord with the results obtained from clover.

ALFALFA.—(Two Cuttings)—Percentages of Albuminoids and Non-albuminoids in Dry Matter.

South side.	Albuminoids.	Non-albuminoids.
First cutting (June 21)	10·0	6·0
Second cutting (Aug. 1)	10·7	5·0

The dry matter of the second cutting is slightly more valuable than that of the first cutting.

North Side—Four Cuttings.—A comparison of the weight of dry matter and albuminoids per ton of fresh material is set forth in the next table.

ALFALFA.—(Four Cuttings)—Dry Matter and Albuminoids per ton in fresh Material.

North side.	Dry Matter, per Ton.	Albuminoids, per Ton
	Lbs.	Lbs.
First cutting (June 4)	404	46
Second cutting (July 15)	544	66
Third cutting (Aug. 19)	419	60
Fourth cutting (Sept. 18)	405	70

The fact that the percentages of dry matter and albuminoids present are influenced by certain factors, principally the number of cuttings, the stage of growth, and season, is well brought out by the above figures. On the whole, the results are in accord with those from the corresponding clover plot, showing that one ton of the fourth cutting is equal as regards albuminoids to 1½ tons, approximately, of the first cutting.

The composition of the dry matter as regards albuminoids and non-albuminoids has been ascertained.

ALFALFA.—(Four Cuttings)—Percentages of Albuminoids and Non-albuminoids in Dry Matter.

North Side.	Albuminoids.	Non-albuminoids.
	Per cent.	Per cent.
First cutting (June 4)	11·3	8·6
Second cutting (July 15)	12·2	3·0
Third cutting (Aug. 19)	14·2	5·9
Fourth cutting (Sept. 18)	17·1	8·0

The Alfalfa differs from the clover in that the non-albuminoids do not decline in the third and fourth cuttings. The percentage of the albuminoids, however, markedly increases in the latter cuttings, as was noticed in the case of the clover. We have seen that, weight for weight, the crops of the first, third and fourth cuttings contain practically the same amount of dry matter, but since, as we have observed, this dry matter of the August and September cuttings is richer in albuminoids, it follows that the crops of these later dates have the greater feeding value.

In conclusion, we may place side by side the pounds per acre of albuminoids obtained from the two and four cuttings of the alfalfa, respectively.

ALFALFA.—Albuminoids—Pounds per Acre.

——	South side.	North side.
First cutting	156	74
Second cutting	66	74
Third cutting	.....	83
Fourth cutting	.....	50
Total	222	281

It is somewhat remarkable that although we obtained a larger total yield, including a larger amount of dry matter, from the alfalfa than from the clover, the difference in albuminoids between that of the two cuttings and the four cuttings is the same, practically, for each crop.

CLOVER AND CLOVER ENSILAGE.

The especial value of clover as a roughage lies in the fact that it contains, in common with other legumes, a large proportion of flesh-forming constituents (albuminoids), thus allowing the use of a less weight of concentrated feed stuffs in the ration than when corn or hay forms the bulky part of the feed.

Though some farmers have not met with success in siloing clover, the causes of failure are apparently known and may be removed. Woll, in his *Book of Silage* says: 'Clover does not pack as well as the heavy, juicy corn, and, therefore, requires more weighting, or more depth in the silo, in order to sufficiently exclude the air.' Further, it is possible that the condition of the clover when put into the silo has much to do with the quality of the resulting ensilage, and regarding this point we may say that the best practice indicates that clover should be in full bloom. If allowed to remain uncut until the flower heads have withered, the clover is apparently too dry to make the best quality of ensilage. For the same reason the clover should not be allowed to wilt, but at once put into the silo.

Good clover ensilage has succulency and palatability in its favour, besides possessing, as we have said, a large proportion of the more valuable nutrients. Investigations, therefore, that seek to ascertain the best possible conditions of its preparation are worthy of our attention. Such investigations are being carried on by the Agriculturist of the Central Experimental Farm, and it is in connection with them that the analytical data about to be given have been obtained.

Mention has been made of the presence of a large percentage of nitrogenous compounds in clover, and it is in this fact that we find one difficulty in ensiling this crop. Nitrogenous substances are particularly susceptible to decomposition, especially in the presence of moisture and warmth. It was principally in order to trace the extent to which these substances had been altered by fermentation in the silo that analyses were made of the clover as put into the silo and of the ensilage taken from various parts of the silo some months later. There are and always will be certain losses in food value by ensiling, but these can be minimized to a large extent provided the clover is in the right condition and properly packed in the silo.*

The fermentative changes that take place in the silo affect both the non-nitrogenous compounds (starch, sugar, &c.), and the nitrogenous bodies. The former, to an extent depending on the degree of fermentation, are converted principally into carbonic acid and water—elements of no food value—and the latter into amides, compounds of much less value than the albuminoids. Since fermentation is kept in check by the exclusion of air, the construction of the silo and the close packing of the fresh material are matters of the greatest importance. With this outline account of the changes that take place in the silo we may proceed to consider the composition of the clover with that of its resulting ensilage, as depicted in table I.

TABLE I.—Analysis of Clover before and after Ensiling.

Constituents.	Clover as put in the Silo Aug. 31, 1900.	Clover Ensilage from centre of Silo Feb. 4, 1901.	Clover Ensilage from bottom of Silo April 11, 1901.
Moisture	76·47	82·60	77·98
Dry matter	23·53	17·40	22·02
Crude protein (nitrogen x 6·25)	3·56	2·94	2·96
Fat (ether extract)	·15	·18	·21
Carbohydrates (starch, sugar, etc.)	7·95	4·44	6·30
Fibre	9·71	7·98	10·15
Ash	2·16	1·86	2·40
Nitrogenous compounds—			
Albuminoids	2·88	1·53	2·08
Non-albuminoids	0·68	1·41	0·88

The experimental round silo in which the clover was preserved has the following dimensions: Height, 22 feet; diameter, 9 feet.

The clover was in full bloom at the date of cutting, August 31, 1900. The filling was made on three consecutive days, so that there would be but little difference in composition of the clover throughout the silo. After the ensilage had settled it filled the silo to a height of 15 feet.

* Woll, in summing up the evidence as to the relative losses in curing and ensiling clover, says: Clover silage is superior to clover hay on account of its succulency and greater palatability, as well as its higher feeding value. The last mentioned point is mainly due to the fact that all the parts of the clover plant are preserved in the silo, with a small unavoidable loss in fermentation, while in hay making, leaves and tedder part, which contain about two-thirds of the protein compounds, are easily lost by abrasion.

The first noticeable feature is the much smaller percentage of dry matter in the ensilage from the middle of the silo—the sample being taken in the centre, seven feet from the bottom—than in the clover or the ensilage from the floor of the silo. This points to a greater degree of fermentation and consequently greater loss of feeding elements in the centre than at the bottom of the silo. Weight for weight, this ensilage is not of an equal feeding value with clover. It is evident that the greater deterioration in the centre and upper part of the silo is due to the larger amount of air present, and this fact points to the value of deep silos and the packing firmly of the material. The loss has taken place both in the crude protein and carbo-hydrates (starch, sugar, gums, &c.). The crude protein consists of the albuminoids and non-albuminoid compounds (amides), and while there has been some loss in the total nitrogen, the breaking down of the former and formation of the latter explains chiefly the deterioration.

This has reference principally to the ensilage from the middle of the silo. The fat or ether extract has increased, but this is more apparent than real, for certain organic acids that are developed during the fermentation are unavoidably, by the process of analysis, determined with the fat.

TABLE II.—Analysis of Clover before and after Ensiling.

(Results on the water-free substance.)

Constituents.	Clover as put in the Silo Aug. 31, 1900.	Clover Ensilage from centre of Silo Feb. 4, 1901.	Clover Ensilage from bottom of Silo April 11, 1901.
Crude protein (nitrogen x 6·25)	15·19	16·94	13·44
Fat (ether extract)	·64	1·01	·95
Carbohydrates (starch, sugar, etc.)	33·74	25·46	28·58
Fibre	41·27	45·89	46·11
Ash	9·16	10·70	10·92
Nitrogenous compounds—			
Albuminoids	12·25	9·25	9·44
Non-albuminoids	2·94	7·69	4·00

Table II. allows us to compare closely the composition of the dry matter of the three samples, and furnishes much interesting information. While the crude protein has increased, demonstrating that the greater loss has been in the carbo-hydrates, the data for which confirm this statement, it is plain from the figures at the bottom of the table that there has been a marked decrease of the albuminoid and an increase of the non-albuminoid nitrogenous compounds. This, means a falling off in feeding value. There has been an increase in the fibre, ash constituents and ether-extract—the latter due to the development of organic acids.

These results are in close accord with those of other investigators. It is, however, probable they are more marked than if there had been a larger mass of ensilage. They certainly support the rules laid down for successfully ensiling clover, and indicate the desirability of large, deep silos, and of excluding air as far as possible by close packing of the material. By these means, fermentation will be largely controlled and excessive losses prevented.

CORN AND CORN ENSILAGE.

There are two methods of preserving corn for winter feeding in common use: by curing in shocks or stooks, and by ensiling. Both methods inevitably lead to a certain degree of loss of fodder, due to the destruction by fermentation of a portion of the carbo-hydrates and protein compounds. Many and careful experiments made and repeated in the United States in order to compare the respective merits of the two plans, have shown that the losses by field curing (stooks), as a rule, exceed those in the silo. Under favourable conditions of ensiling—that is, with a fairly mature corn, and a well constructed silo—the loss in food value by fermentation is probably less than 15 per cent, but in shocked corn the loss appears to be seldom less than 20 per cent.*

It has been abundantly shown that the dry matter of stooked corn and corn ensilage has practically an equal digestibility. We have, however, two important qualities more highly developed in ensilage than in stooked corn, viz., succulency and palatability, and this fact makes the former a much more desirable food, especially for dairy cows. On the score of labour and loss in feeding, it is generally held by practical men that ensiling is the much more economical plan.

The object in the present investigation, as in the case of the clover just recited, was to ascertain the extent to which the feeding value of the corn had suffered by ensiling.

The total loss that ensued is not deducible from our data, but the results obtained allow us to compare, weight for weight, the corn as put into the silo with the corresponding ensilage produced.

Three samples of the corn as it was being put into the silo were taken on the 14th, 15th and 27th of September, 1900, respectively. They represented the quality of the corn, (1) at the bottom of the silo ; (2) 22 feet from the bottom of the silo, and (3) 28½ feet from the bottom, or 1½ feet from the top of the silo. The silo is 17 feet in diameter and 30 feet high and was filled to the top. The weight of corn ensiled was, approximately, 150 tons.

The samples of ensilage, which were intended should correspond with the foregoing, were collected on January 31, March 1, April 3, and April 6, 1901. The January sample, it was expected, would represent the corn at the top of the silo (September 27); the March sample, that from the centre of the silo (September 15), and the two April samples, one from the bottom and the other 2½ feet from the bottom of the silo, that as first put into the silo (September 14).

The composition of the three samples of corn and four of ensilage is given in table I., the data of which allow us to compare the feeding values of the corn and corresponding ensilage weight for weight, and furnish us with an insight into the changes that occurred during the ensiling process. In table II. these changes are made more apparent by calculating the nutrients upon the water-free substance.

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* The extent of the deterioration in shocked corn will depend upon the condition of the corn when cut, the length of time it is left shocked in the field and the character of the weather during that period.

TABLE I.—Analysis of Corn before and after Ensiling.

Constituents.	A.—Corn as put in the Silo; sample from bottom of Silo, Sept. 14, 1900.	B.—Ensilage sample from floor of Silo, April 6, 1901.	C.—Ensilage sample taken 2½ feet from bottom of Silo, Apl. 3, 1901.	D.—Corn as put in the Silo; sample taken 22 feet from bottom, Sept. 15, 1900.	E.—Ensilage sample taken 11 feet from bottom of Silo, Mar. 1, 1901.	F.—Corn as put in the Silo; sample taken 1½ feet from top, Sept. 27, 1900.	G.—Ensilage sample taken 2 feet from top of Silo, Jan. 18, 1901.
Water	81·83	81·98	76·71	83·43	77·41	80·67	84·95
Dry matter	18·17	18·02	23·29	16·57	22·59	19·33	15·05
Crude protein (nitrogen x 6·25)	1·63	1·11	1·70	1·63	2·09	1·88	1·16
Fat	0·10	0·10	0·26	0·08	0·17	0·06	0·15
Carbohydrates	9·72	9·33	12·96	8·65	11·08	10·07	6·68
Fibre	5·49	6·37	8·06	4·88	7·82	5·83	5·63
Ash	1·23	1·11	1·31	1·33	1·43	1·49	1·43
Nitrogenous compounds— Albuminoids or true protein	1·25	0·66	0·85	1·32	0·84	1·56	0·77
Non-albuminoids (amides, &c.)	0·38	0·45	0·85	0·31	1·25	0·32	0·39

The more important facts to be noted in connection with the percentages of dry matter are observable from the following tabular summary:—

	Dry Matter Per cent.
Bottom of Silo—	
Corn	18·17
Ensilage, floor of silo	18·02
Ensilage, 2½ feet from bottom	23·29
Middle of Silo—	
Corn	16·57
Ensilage, 11 feet from bottom	22·59
Top of Silo—	
Corn	19·33
Ensilage, 2 feet from top of silo	15·05

In the corn, the dry matter varied from 16·57 per cent to 19·33 per cent; in the ensilage, from 15 per cent to 23 per cent.

There is a very close accordance between the percentages of dry matter in the corn as first put into the silo and the ensilage as taken from the floor of the silo; such changes as have taken place have evidently not altered the material in this respect.

The most remarkable data are the percentages for the ensilage samples C (April 3), and E (March 1), in which the dry matter exceeds by 5 per cent or more that of the corn put into the silo (A and D). It is difficult to understand the character of changes that could bring about such a result. The explanation appears to lie in the fact that there was a considerable loss by leakage from the silo, owing to the unavoidably immature condition of the corn. Such would tend naturally to increase the percentage of dry matter in the ensilage.

In the ensilage taken from the top of the silo (G) we find 4 per cent more moisture than in the corn used, resulting necessarily in a similar decrease of the dry matter. This is due, we presume, to the combustion (by fermentation) of the dry matter, in which the nutrients—starch, sugar, &c. (carbo-hydrates) have suffered most.

The effect of ensiling upon the nitrogenous compounds is a marked one. The albuminoids or flesh-formers are largely reduced to the less nutritive form, amides.

The changes in the relative proportions of the nutrients are more easily followed from a perusal of the percentage composition of the dry matter of the various samples, as given in table II.

TABLE II.—Analysis of Corn before and after Ensiling.

(Results on water-free substance.)

Constituents.	A.—Corn as put in the Silo; sample from bottom of Silo, Sept. 14, 1900.	B.—Ensilage sample from floor of Silo, April 6, 1901.	C.—Ensilage sample taken 2½ feet from bottom of Silo, Apl. 3, 1901.	D.—Corn as put in the Silo; sample taken 22 feet from bottom, Sept. 15, 1900.	E.—Ensilage sample taken 11 feet from bottom of Silo, Mar. 1, 1901.	F.—Corn as put in the Silo; sample taken 1½ feet from top, Sept. 27, 1900.	G.—Ensilage sample taken 2 feet from top of Silo, Jan. 18, 1901.
Crude protein (nitrogen x 6·25)	8·94	6·18	7·28	9·69	9·23	9·63	7·71
Fat	0·54	0·56	1·12	0·46	0·74	0·33	1·00
Carbohydrates	53·52	51·75	51·38	52·36	49·10	52·18	44·34
Fibre	30·23	35·35	34·59	29·45	34·61	30·14	37·43
Ash	6·77	6·16	5·63	8·04	6·32	7·72	9·52
Nitrogenous compounds—							
Albuminoids or true protein	7·00	3·64	3·66	7·81	3·72	8·13	5·11
Non-albuminoids (amides, &c.)	1·84	2·54	3·62	1·88	5·51	1·50	2·60

The Composition of the Dry Matter of Corn and its Resulting Ensilage.

Bottom of Silo.—Contrasting ensilage B (floor of silo) with corn A, we notice that the chief differences are in the nitrogenous compounds. There has been some loss in nitrogen during ensiling, amounting to, approximately, .5 per cent, calculated on the dry matter. A much more serious loss from the feeding standpoint is to be noticed in the reduction of the albuminoids into non-albuminoid substances (amides).*

In the corn as placed in the silo (A), 80 per cent of the total nitrogen present exists in the albuminoid form, whereas in the ensilage taken from floor of silo (B), but 59 per cent is present in this more valuable condition.

Comparing the corn (A) with ensilage (C), taken 2½ feet from the bottom of the silo, we find that a further reduction has taken place, and only 50 per cent of the nitrogen compounds exist as true albuminoids.

The crude fibre has increased to the extent of from 4 to 5 per cent by ensiling. The other changes are insignificant, the principal one being a loss of about 2 per cent of the carbo-hydrates.

Middle of Silo.—Comparing the composition of the dry matter of the corn (D) with the resulting ensilage (E) taken 22 feet from the bottom of the silo, we may make the following deductions:—

The crude protein, obtained by multiplying the total nitrogen by the factor 6·25, is approximately the same in both, but a reference to the relative proportions contained therein of albuminoids and non-albuminoids reveals that there has been a notable reduction of the former to the latter. Thus, in the corn, 80 per cent of the nitrogen is in the more valuable albuminoid form, whilst in the resulting ensilage only 40 per cent is so present.

*The comparative food value of the albuminoids and amides stands approximately at 2·5 : 1, in other words the latter compounds may be considered about on a par with the carbo-hydrates.

The fat is apparently higher in the ensilage, but as organic acids, as already explained, are by the process of analysis estimated with the fat, this gain is more apparent than real.

There is a difference of about 3 per cent of carbo-hydrates in favour of the corn.

The fibre has increased by ensiling to an extent of about 5 per cent. This, of course, does not mean that there has been any development of fibre, but that other nutrients have disappeared, necessarily increasing the proportion of this constituent in the dry matter.

Top of Silo.—We notice, first, a reduction of 2 per cent of crude protein by ensiling. Examining more closely into its character it will be seen that in the corn (F) 84 per cent of its nitrogen exists as albuminoids,* whereas in the ensilage (G) this was reduced to 65 per cent. By comparing these data with those stated for the ensilage at the bottom and in the middle of the silo, it will be noted that the conversion of the albuminoids, and hence the reduction in food value, has not apparently been so great in the upper part of the silo. At all events, we can say that the ensilage in the latter contains a larger proportion of albuminoids than that in the lower portions of the silo.

Again, the apparent gain in fat is to be observed.

The dry matter of the ensilage shows about 8 per cent less carbo-hydrates than the dry matter of the corn as put into the silo, showing that fermentative changes have been active.

The fibre, the least of all the nutrients to be effected by ensiling, as in the instances already discussed, has been increased in the sample by about 7 per cent. This results chiefly from destruction of the carbo-hydrates.

In considering the foregoing deductions from this research it should be borne in mind that the corn as put into the silo was less mature than usual. The season of 1900 was not so favourable for maturing this fodder crop, as, for instance, that of the present year, when the corn as cut contained approximately 22 per cent of dry matter. This fact of the larger percentage of water in the crop of 1900 (the one under consideration) no doubt accounts in a large measure for the extent to which deterioration had taken place in the food value of the ensilage. It has been well established that mature corn, that is corn that has come to the glazing condition, yields ensilage of a greater feeding value than corn siloed when less mature. The destructive changes we have noted are largely accelerated by the great percentage of moisture in immature corn.

Further, it must be remembered that we have been considering the values of the corn and resulting ensilage compared, weight for weight. Our data do not allow us to make any inferences as to the total loss of nutrients that may have occurred in the silo.

THE GRASS PEA (*Lathyrus sativus*).

In the early part of the present year a request was received from Mr. W. J. Gerald, Deputy Minister of Inland Revenue, Ottawa, asking us to investigate the correctness of the statement that the grass pea possessed poisonous qualities and could not be fed with impunity. This pea, or rather vetch, is now being somewhat extensively grown in certain districts of Ontario, owing to its prolific character and alleged immunity to the attacks of the pea weevil. It has thus found its way, perhaps to the extent of 2 per cent or thereabouts, into the peas exported to England, from whence the objection above referred to came.

It is the grain of this plant that, according to many learned authorities, causes the disease known as lathyrismus, a form of paralysis, which occurs in India when, in times of famine, large numbers of the natives are obliged to live upon it, practically,

*In the corn samples A and D this percentage was approximately 80. The larger proportion in the corn (F) is due to the more mature condition of the plant when cut—some twelve days later than A and D.

exclusively. Much has been written upon the subject and many theories advanced as to the nature of the poison. Statements have appeared to the effect that a volatile alkaloid, which has a toxic action, has been isolated from the seed, but all the announcements to the effect that a poisonous principle has been identified—and they are several—appear to lack definiteness and verification. As might be supposed, the matter has received investigation at the hands of chemists and physiologists. In this connection we may state that Professor Wyndham R. Dunstan, director of the laboratories of the Imperial Institute, England, has for some time past been engaged on this difficult problem, working on Indian seed, so far, we understand, without being able to isolate any poisonous principle. We may, therefore, say that as yet nothing of a definite character has been evolved from chemical examination, and that the real nature of the cause of lathyrismus is shrouded in mystery, though there is a strong probability that the thorough researches of Professor Dunstan now in progress will eventually furnish data of a satisfactory nature.

In the endeavour to ascertain whether the grass pea as grown in Canada is identical with that of India, plants were grown by us from seed obtained in western Ontario and from seed which came from the north-western provinces of India, the latter being kindly furnished by Professor Dunstan. The bloom of these plants was examined for us, in the absence of the botanist of the farms, by Professor Bemrose, of the Pharmaceutical College, Montreal, to whom I am indebted for a most careful report on the same. He says that there are no essential or important differences to be observed between them, and that both belong to the same species, *L. sativus*. The flowers from the Indian seed are blue, while those from the Canadian seed have proved with us invariably white. This, however, is not regarded as denoting any fundamental or specific difference, since the flowers of many members of this order are known, under the same conditions, to vary in colour—that is, may appear as white, blue or purplish.

Certain differences are, however, to be noted between the Indian and Canadian seed. Both are alike in having the flattened wedge-shape, but the former are dark gray to very dark brown in colour and mottled, and possess a dark or black line running two-thirds round the seed, while the latter, as far as is known to the writer, are invariably white or greenish-white. Whether these marked characters denote varietal differences it would be hazardous to say, but at all events they are worthy of mention in a consideration of this subject.

We submitted the Canadian grown seed to a very careful and thorough investigation, following the elaborate scheme of Dragendorff for the isolation of alkaloids, glucosides, &c., and also employed several other special processes for the detection of poisonous principles. Quantities varying from 300 grams to 1,500 grams (11 ounces to 3½ pounds) were used in the various processes of analysis. In no case, however, was any poisonous principle or alkaloid obtained, all the results being negative in character.

A feeding test was then instituted under our immediate supervision. Two fowls (a cock and hen) were fed on this grain, practically exclusively from April 17 to June 28, 72 days. At the end of this period both fowls were in excellent condition, lively and healthy. During the experiment they always had a good appetite and ate the peas with avidity. They were kept on other grain, principally oats, from June 28 to August 20, in order to notice if any after effects of the pea ration might manifest themselves, but the fowls remained healthy. In connection with this experiment the following data were obtained and will be found of interest in showing that no injurious results followed the consumption of the grass pea.

During the 72 days of trial the fowls ate 23 pounds 3 ounces of grain. All that they would eat was given to them twice daily, the amount varying from 1½ ounces each at first to 3½ ounces as they became accustomed to the feed, the average being from 2½ to 2¾ ounces each per diem.

The hen laid 13 eggs during the time of the experiment, in spite of the confined quarters and the lack of that variety of food usually considered necessary for egg production.

The weights of the fowls as taken during the trial were as follows :—

—	Cock.		Hen.	
	Lbs.	Oz.	Lbs.	Oz.
April 27	3	1½	2	11½
July 2	3	15	3	15
August 20	3	15	4	1

It is thus seen that both fowls gained in weight on this diet.

Subsequent to the foregoing experiment we made the following investigation to ascertain if the oil or fat of this pea possessed any toxic properties. A considerable quantity of the finely ground peas was repeatedly exhausted by redistilled gasolene. Finally, this solvent was allowed to evaporate spontaneously and the resulting fat, weighing 1½ grams, was made up with starch and several capsules filled with the mixture. These capsules were slipped down the throat of the hen. Though a careful watch was kept for more than a week, no harmful results were noticeable, the hen remaining bright and lively and evidently in good health.

We purpose continuing this research, but it is satisfactory to note that all the work done points to the non-injurious character of the Canadian grown seed.

It may be added that we have received the testimony of several farmers in western Ontario who have largely fed this pea. In no instance have they recorded any injurious results or symptoms, and they report it as a valuable and harmless feed for all classes of stock.

In conclusion, it will be of interest to place side by side the food analysis of the Canadian and Indian grown seed. The former has been made in our laboratories; the latter is taken from Watt's Dictionary of Economic Products of India:

	Canadian.	Indian.
Moisture	11·51	10·10
Albuminoids	26·12	31·90
Fat	·93	·90
Carbo-hydrates	53·78	53·90
Fibre	5·04	
Ash	2·62	3·20
	100·00	100·00

The chief point of difference lies in the percentage of albuminoids, which in the Indian seed appears to be abnormally high, and there seems some ground for doubting the correctness of this determination.

CORN BY-PRODUCTS: GLUTEN MEAL, GLUTEN FEED, ETC.

We have reason to know from correspondence that our dairymen and stock-feeders are yearly paying more attention to the quality of the feed they use, and especially to that which it is necessary to buy to supplement the home-grown fodder. This is an encouraging sign, for, speaking generally, the profitable production of milk and flesh can only follow the economic purchase and use of the 'concentrates' of the ration, which we notice have recently risen considerably in price. This demands primarily a knowledge of the composition of these materials.*

* Information regarding the functions of the various constituents of fodders in the animal system, their digestibility and the desirability of a balanced ration, has been furnished in reports of this Division for 1890, 1892 and 1898.

These as has been stated, are bought to supplement and balance the coarse fodders of the farm, or, in other words, to furnish protein and fat, and consequently it is according to the percentages of these constituents that they must be valued. Prominent among them are the various milling by-products of wheat, oats, and Indian corn. It is of the latter, since they are comparatively new in our markets that we shall here treat, giving analyses of several made during the past year in the farm laboratories.

The establishment in Canada of starch factories has resulted in the production of a number of materials derived from the corn kernel which can be used to advantage as cattle feed, but which differ in their value according to the part of the grain entering into their composition.

The corn kernel, for our present purposes, may be considered to consist of (1) the husk or skin, which is fibrous; (2) a layer of more or less yellow cells containing a large proportion of gluten; (3) the larger mass or body of the kernel, nearly pure starch; and (4) the germ, rich in protein, but especially so in fat and mineral matter. In the preparation of the starch, all save this constituent find their way into the by-products, sometimes singly, sometimes mixed. Though all manufacturers do not adopt precisely the same terms, the following have been commonly accepted: Gluten meal, especially rich in protein, and also containing a large proportion of oil; Germ meal, the dried and ground germ, and consequently high in protein and very rich in oil; Corn oil cake, and corn oil meal, the germ from which the large amount of oil has been expressed, but still very rich in this constituent; Corn bran, the hulls or skin of the corn, much lower in feeding value than any of the preceding; and Gluten feed, which consists of all the by-products mixed, and may be regarded as corn minus its starch, containing large percentages of protein and oil, but not so rich in either as gluten meal.

These definitions will prove useful as a guide, but since some manufacturers employ the terms rather loosely, as, for instance, gluten meal to designate the mixture of all the by-products (gluten feed), and further, that methods of preparation differ, a fact which affects the composition of the product, they should not be depended upon solely. An analysis showing the percentages of protein and oil should be asked for, so as to allow the purchasers to estimate the comparative values of the brands offered.

The subjoined table gives the composition of the more important brands produced in Ontario, as determined from samples obtained from the manufacturers or their agents. In several instances results from two or more samples of the same brand received at different dates are given.

Analysis of Gluten Meals, 1901.

No.	Brand.	Manufacturer.	Moisture.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
			p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
1	Maize gluten meal, Jersey Brand.	St. Lawrence Starch Co., Port Credit, Ont.	5·93	18·33	7·25	64·10	4·04	·65
2	" "	" "	8·76	17·31	7·69	61·33	4·36	·55
3	" "	" "	7·03	16·44	6·11	64·01	5·75	·66
4	Gluten meal.....	Brantford Starch Co., Brantford	6·61	17·18	9·95	59·58	6·01	·67
5	Corn gluten meal..	Edwardsburg Starch Co., Cardinal, Ont.	5·25	36·68	11·05	43·83	1·54	1·65
6	" "	" "	7·68	37·87	6·80	45·49	1 05	1·11
7	Corn oil cake*.....	" "	3·21	21·19	36·49	31·65	6·61	·85
8	Germ feed†.....	" "	4·62	13·81	8·53	56·45	15·79	·80

* This sample is evidently not a normal 'oil cake,' but rather the germs from which a small percentage of the oil has been expressed.

† This should be known rather as corn bran, since it consists largely of the hulls or skin of the corn.

Although corn is a grain poor in protein and mineral matter, and, therefore, not suitable for use as the sole grain, it is seen that many of its by-products are very rich in these constituents, besides containing large amounts of fat. These products may, therefore be considered as valuable adjuncts to our list of concentrated feeds, wholesome and nutritious, and eminently adapted to forming a part of the grain ration, both both for milch and fattening stock.

CATTLE FEED.

At the request of the Department of Marine and Fisheries, Ottawa, analysis has been made of two samples termed 'Cattle Feed,' to ascertain their feeding value. The object of the investigation was to learn which would be the more nutritious as food for cattle in transport to England.

These 'feeds' consist chiefly of crushed or partially ground oats and Indian corn, the proportion of the former to the latter being apparently somewhat greater in No. 1 than in No. 2. A few weed seeds and small grain (cereals) are to be observed in both samples, though there are no indications of 'mill sweepings' having been used in their preparation. A general examination of the samples showed a strong similarity in composition, but that of No. 1 is probably somewhat the better of the two. This conjecture is borne out by the chemical data, which are as follows:—

	No. 1.	No. 2.
Moisture	9·18	9·30
Protein	12·81	10·75
Fat	3·90	4·63
Carbo-hydrates	61·09	61·28
Fibre	10·00	11·37
Ash	3·02	2·67
	100·00	100·00

The chief points of difference are, (1) that No. 1 is somewhat the richer (2 per cent) in albuminoids and that No. 2 contains a little more fat, approximately, ·75 per cent.

The albuminoids (protein) and fat constitute the most valuable nutrients of a fodder, and are usually assumed to be worth, weight for weight, 2½ times the carbohydrates (starch, sugar, &c.). On this basis we find by calculation that one ton of No. 1 feed is equal in feeding value to 1 ton 63 pounds of No. 2. If No. 1 is worth $15 per ton, then the value of one ton of No. 2 would be $14.54.

In arriving at these conclusions, we have been obliged to assume the feeds to be of equal digestibility, and the probability is that in actual feeding the difference in favour of No. 1 will be a little greater than shown by the foregoing computations.

RICE FEED.

This material, a by-product in the preparation of rice, is of considerable feeding value. Rice hulls are very fibrous and woody, but the bran coats of the seed, the germ and the rice 'polish' are all more or less rich in protein, fat and mineral matter.

The sample examined was forwarded by Mr. Peter Reid, Chateauguay Basin, Que., who states that it was obtained from the Mount Royal Milling Company's mill at Cote St. Paul. He gives the price (Nov. 20, 1901) at $18 per ton, and says : 'The meal is made from the husk of the grain, corresponding to the bran of wheat, I presume, together with particles of the grain broken off when running through the husker and polisher.'

Composition of Rice Feed.

Moisture	8·39
Protein	12·31
Fat	12·39
Carbo-hydrates	47·51
Fibre	11·11
Ash	8·29
	100·00

We should presume this to be an excellent feeding stuff for dairy cows. Its mechanical condition is favourable to the digestion of the feed, and its composition is such that all the desired nutrients are furnished in good proportion.

In 1892 we analysed a sample designated 'Rice Meal,' forwarded from Victoria, B.C. Its composition was as follows:—

Moisture	11·47
Protein	11·34
Fat	12·75
Carbo-hydrates	50·31
Fibre	6·95
Ash	7·18
	100·00

This sample evidently contained a smaller proportion of hulls than the 'feed' under consideration, but otherwise they are of a similar character.

For the purposes of comparison, we insert the following data of rice and its products, taken from 'Analysis of American Feeding Stuffs, Jenkins & Winton.'

—	Water.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Rice	12·4	7·4	·4	79·2	·2	·4
Rice meal	10·2	12·0	13·1	51·2	5·4	8·1
Rice hulls	8·2	3·6	·7	38·6	35·7	13·2
Rice bran	9·7	12·1	8·8	49·9	9·5	10·0
Rice polish	10·0	11·7	7·3	58 0	6·3	6·7

BIBBY'S CREAM EQUIVALENT—CALF MEAL.

An experiment was recently conducted in calf feeding at the Central Experimental Farm, in which this material formed one of the feeds under trial. It was, consequently, deemed advisable to ascertain its feeding value, as far as that could be learnt from a chemical and microscopic examination. This is an English preparation, used as a partial substitute for milk in the rearing of calves, and costs $3.50 per cwt. at Ottawa. It has a slight, pleasantly aromatic odour in which that of locust bean is particularly noticeable.

Composition of Calf Meal.

Moisture	10·40
Protein	12·75
Fat	11·19
Carbo-hydrates	57·88
Ash	3·08
Fibre	4·70
	100·00
Water soluble extract	17·29
Saccharine matter, in water soluble extract	6·40

A microscopic examination reveals the presence of linseed meal and bean (probably locust) meal as the chief ingredients.

It will be of interest to compare the ratio of the chief constituents of this food with that given by milk, in order to learn how far this substitute approximates milk in the balance of its nutrients. To do this we shall have to assume that the digestibilities of the protein, fat, and sugar in both are equal. This is not strictly accurate, and gives an advantage to the calf meal, but is rendered necessary by the fact that we have no data as to the digestibility of this material.

Approximate Ratio of Nutrients in Milk and Calf Meal.

	Protein.	Fat.	Carbo-hydrates.	Ash.
Milk	10	11	13	2
Calf meal	10	9	45	2

Save for the excess of carbo-hydrates, the balance of nutrients in the calf meal is very well preserved. Only one-ninth of the carbo-hydrates, however, is present as sugar (6·40 per cent), and, therefore, immediately digestible, or rather, assimilable; whereas in milk, the sugar constitutes the whole amount of the carbo-hydrates, and is entirely digestible. This, in a measure, affects the calculation, but yet not to such an extent as to prevent drawing the conclusion that in the essential relationship of the nutrients, and more particularly between the protein and fat, this substitute is not unlike milk.

Of course, such feeds, no matter how well compounded, can only be considered, at best, as partial substitutes for milk, and the proportion in which they can be advantageously used will depend not only on their composition, but also on their price.

CANADIAN POTATO STARCH.

At the request of the Inland Revenue Department, Ottawa, we have submitted to a careful analysis a sample of potato starch from the mills at Baie du Febvre, Yamaska, Quebec.

A chemical examination as to the purity of the starch afforded the following data:—

Moisture	16·70
Ash or mineral matter	·67
Nitrogen	·017
Fibre or cellulose	None.

Moisture.—According to Allen (*Commercial Organic Analysis, Vol. I., p. 418*) 'The proportion of water in air-dried starch averages about 18 per cent, but is liable to variation.' It is clear from this statement, therefore, that the sample under consideration is in this respect quite equal to the standard brands upon the market.

Ash or Mineral Matter.—Pure starch does not contain any ash, but commercial starch, since it usually possesses traces of foreign matter, such as vegetable fibre, nitrogenous substances, &c., frequently shows a small percentage of mineral matter derived from these constituents. The very small amount we have found present in this sample would not, in our opinion, detract in any way from its value for those purposes for which potato starch is employed. In this respect, however, it seems to be scarcely equal to some of the finer starches used in cooking.

Nitrogen.—The above recorded percentage shows that this sample contains traces only of albuminoid matter.

Fibre.—Analysis did not reveal the presence of any appreciable amount of vegetable fibre.

Reaction.—This starch has a slightly acid reaction, though no traces of mineral acids could be detected. Presumably this trace of acidity is developed during its manufacture. Most probably this feature would not affect in any way the value of the starch, but on this point there are no data at our command. Such samples of corn and rice starch as we have examined have been invariably found to be slightly alkaline.

Microscopic Examination.—A few fragments of foreign material, evidently vegetable tissue, are discernible. Many brands of commercial starch contain such traces, their presence being due to imperfect separation in manufacture, but the very finest qualities are stated to be so pure in this respect as to be free even from traces of fibre or tissue.

CANADIAN BUTTER AS EXPORTED.

In March of the present year we received a request from the Department of the Secretary of State, Ottawa, to analyse and report upon a sample of Canadian butter that had been condemned and prohibited from sale in Cuba on the ground that it was adulterated, the custom's analyst at Havana having certified that it contained 35 per cent oleomargarine. Unopened samples of the butter from the condemned consignment had been returned at the instance of the Secretary of State, and these were forwarded to the Farm laboratories. Having submitted the butter to a very careful and complete examination, we made the following report, which in the fullest way bears out the claim of the manufacturer and exporter, that the butter is pure and unadulterated.

ANALYSIS AND REPORT.

Butter received from the Department of the Secretary of State, Dominion of Canada, and contained in a 2-lb. tin, hermetically sealed and bearing the following marks:—'Extra Finest Canadian Butter, Pierre de Bacourt, Central Creamery at Scott Junction, Dorchester, Canada.' Written in ink on bottom of tin is '9478 R. Truffin & Co., ss. *Mexico*. September 17, 1900, 4 cases, out of case No. 636.' Tin bound with tape and seals intact 'Deputy Collector (official) of Customs.'

Analysis.

Fat	83·15
Water	10·70
Salt	4·02
Curd, by difference	2·13
	100·00

Estimations on the dry, filtered Butter-fat.

*Reichert No. (volatile fatty acids)	27·45
Saponification equivalent (Koettstorfer)	249·3
Specific gravity at 100° F.	·912

* Corresponding to 5 grams fat.

Paraffin could not be detected, even in traces.

The above data are entirely in accordance with those of pure, unadulterated butter, and conclusively prove the absence of oleomargarine or other foreign fats.

CHEMISTRY OF INSECTICIDES AND FUNGICIDES.

ANALYSIS OF CERTAIN BRANDS OF LYE.

Solutions of lye are used for the destruction of insects and cleansing the bark while the wood is still dormant, that is, before the leaves appear. In response to requests from orchardists, both in Ontario and Nova Scotia, for information regarding the relative values or strengths of the better known brands of lye sold in Canada, we have during the past season submitted to analysis, Gillett's 'Perfumed 100 per cent Lye,' Greenbank's 'Soapmaker,' Babbitt's 'Pure Potash or Lye,' and a sample of 'Rock Potash' obtained from a wholesale drug firm in Montreal.

Our results may be tabulated as follows:—

	Alkali Present as Caustic Soda.	Alkali Present as Carbonate of Soda.
Gillett's Perfumed 100 per cent Lye	92·48	2·77
*Babbitt's Pure Potash or Lye	85·15	4·98
Greenbank's Soapmaker	71·44	5·51

*There is no potash in Babbitt's brand, the alkali present being soda.

The analysis of Rock Potash showed:—

Alkali, as caustic potash	36·72
Alkali, as carbonate of potash	43·24
The total potash present, calculated as oxide, is	69·31

These, of course, are all commercial products and consequently contain varying amounts of chloride of soda, and in some instances certain sulphates, besides oxide of iron and alumina. These impurities, however, do not interfere with the efficiency of the material for the use here considered. The relative strength of the lyes as a wash is indicated primarily by the amount of caustic alkali contained, and, secondarily, by that of the alkali as carbonate. The use of Rock Potash would furnish an important fertilizing element, absent in the ordinary brands of lye upon the market.

GAS-LIME.

Gas-lime is a by-product in the purification of illuminating gas, and may frequently be obtained for the cartage. It has a certain value for the destruction of the larvæ of noxious insects, slugs, centipedes, &c., in the soil, but must be employed with some caution owing to the fact that when fresh from the gas works it is injurious to vegetation. These injurious properties which really give this material its insecticidal value, are chiefly due to certain sulphur compounds (principally sulphide of lime), but sometimes in a measure to more or less tar and other organic compounds that may be present. Thoroughly weathered gas-lime, as when left in small heaps on the field for two or three months, however, has lost for the most part its injurious qualities by

the more or less complete conversion of the sulphide and other sulphur compounds into sulphate of lime (gypsum), which as we know, is a valuable fertilizer especially for soils deficient in lime. To this end, therefore, it is advisable to spread the gas lime, or to place it in small heaps, on the field in the autumn, ploughing or harrowing under the following spring.

As an insecticide, pure and simple, its action of course will be more pronounced if at once (without weathering) it is ploughed or harrowed into the soil ; but by so doing there would be some danger of injuring vegetation.

Naturally, gas-lime is variable in composition, and consequently it is difficult to state the limit to which it can be safely applied, but the usual amount will be between 2 and 6 tons per acre, and speaking generally we should advise a trial with the lesser quantity. In Holland it has been used freely on heavy clay soil to the extent of 2 to 2½ tons per acre. In England. applied in autumn from 2 to 4½ tons per acre. It is stated to act injuriously if applied directly to grass lands during the growing season.

An analysis of gas-lime made in the farm laboratory appears in the report of this Division for 1890, to which is appended an account of the value of this material from the standpoint of a fertilizer.

NOTES ON INSECTICIDAL MIXTURES.

The following information in answer to inquiries submitted through the Entomological Division, is inserted as of general interest to fruit growers :—

Proposed Mixture of Lime-wash and Soft Soap.—The correspondent wished to know if the good qualities of these materials could not be obtained in the one mixture, and thus half the labour of application saved. Experiments were made in the laboratory, using thin lime-wash and whale-oil soap, and the results obtained confirmed our conjecture as to the unsuitability of the mixture.

A curdy lime-soap is precipitated, which in our opinion would not be so effective as the original (potash) soap. Further, we believe, the mixture would be found to have very poor adhesive qualities.

The Addition of Washing Soda or Lye to the Soft Soap solution.—We were asked if there would be any advantage in adding lye or sal soda to the soft soap wash.

There is no chemical reason against this practice, and the mixture would be stronger, *i.e.,* more caustic, than the soap solution alone. There must, however, be a limit to the proportion in which lye could be so used, for if the mixture were too caustic there would be injury to the bark. Naturally, one would expect a soft soap solution, strengthened with lye, to be more effective as an insecticide than the former alone or with washing soda.

The relative value of Soft Soap and Whale-oil Soap in insecticidal preparations.—It is scarcely possible to say from the chemical standpoint which of the two—soft soap or whale-oil soap—would be the more effective, though we might expect that a determination of the excess of free alkali present would give an indication in that direction. This, no doubt, varies somewhat in each sample. Whale-oil soap most probably owes its virtue in a large part to its qualities as a deterrent, and in this respect it must certainly be considered as more effective than a soft soap made with a vegetable oil.

On the use of Sal Soda instead of Lime in the Paris green mixture.—In answer to the inquiry: 'Can sal soda be used instead of lime in the preparation of Paris green mixture?,' the following information is submitted:—

When Paris green mixed with water (at the usual rates of 1 pound to 100-200 gallons) is applied to certain classes of delicate foliage (as of stone fruits) a corrosive or 'burning' effect has been noticed to follow, the leaves showing decided marks of injury as the insecticide dried upon them. This is due to a certain small percentage of free (uncombined) arsenic. This injurious effect may be entirely overcome by the addition

of a small quantity of lime, the usual amount advised being 1 pound to each 1 pound of Paris green, though this is probably much more than is absolutely necessary.

Sal soda (more commonly known as washing soda) should chemically effect the same purpose as the lime, though in the apparent absence of recorded experimental data it would not be wise to generally advise the substitution. Arsenate of soda, as is well known, is more or less injurious to foliage, but the compound formed in the mixture under discussion would rather be arsenite of soda, regarding the action of which on foliage I cannot find any reference. I, however, am of the opinion, drawn from a general consideration of the whole subject, that lime would be better, or rather, safer to use, since the soda-arsenic compounds are easily soluble in water, and hence more likely to affect the foliage.

To obtain the neutralizing effect of 1 pound of slaked lime, approximately 4 pounds or ordinary crystallized washing soda would be required. This quantity of lime, however, as already pointed out much exceeds that absolutely necessary, and most probably 2 pounds washing soda (equivalent to ½ pound of lime) would be ample. An experiment recently made here showed that when 4 pounds of sal soda in solution were added to a mixture of 1 pound of Paris green in 160 gallons of water, considerable traces of arsenic went into solution ; in other words, that there had been a slight decomposition of the Paris green. When, therefore, through inability to conveniently obtain lime, sal soda is substituted, we should advise not more than 2 pounds to each pound of Paris green ; but in view of the general results of soluble arsenic compounds on foliage, and in the absence of any definite data from spraying experiments with the mixture under discussion, it would be safer to use lime whenever possible. The arsenate of lime that may be formed in the fluid from following this course has been shown to be non-injurious to foliage and an excellent insecticide.

It might be pointed out that when Paris green is used in Bordeaux mixture there is no need for further addition of lime, to prevent injury to foliage, and that in this mixture both the fungicidal and insecticidal properties are unimpaired.

WELL WATERS FROM FARM HOMESTEADS.

For the year November 30, 1900, to December 1, 1901, 96 samples of well waters have been received for analysis. From the tabulated statistics in the letter of transmittal it will be seen that while the largest number of samples were received from Ontario, farmers in every province of the Dominion have availed themselves of the privilege extended to them in this matter.

Owing to insufficiency in the quantity sent, to dirty bottles or corks, &c., it was found impossible or inadvisable to submit to analysis a number of the waters received, and in this connection it may be well to again point out that the necessary instructions to be followed in collecting and shipping the sample will be forwarded to farmers and dairymen upon application.

We would further state that the examination of mineral or supposed medicinal waters is not undertaken.

Each water, as analysed, is reported upon to the sender and such advice given or suggestions made regarding the water supply as the results would justify. These reports cannot be inserted here, for want of space, but a brief statement regarding the quality of the waters will be found in the last column of the appended table of data.

Of the 64 waters submitted to complete analysis, 19 were reported as pure and wholesome, 18 as decidedly suspicious and probably dangerous, 16 as seriously polluted, and 11 as saline waters.

1-2 EDWARD VII., A. 1902

ANALYSIS OF

RESULTS STATED IN

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.
			1901.				
1	Elgin, Ont.	R. B. R.	Jan. 11.	·078	·343	21·83	370·0
2	Lot 9, Con. 1, Gloucester, Ont.	J. O'C.	" 30.	16·57	·325	·28	3500·0
3	Pond near Toronto, Ont.	J. M.	Feb. 2.	·27	·22	2·594	9·0
4	Melita, Man.	A. E. E.	" 4.	.....	.....	.....	.....
5	Archer, Ont.	J. F. C.	" 20.	·015	·058	·915	2·2
6	Norway, Ont.	S. H. J.	" 21.	12·83	·512	1·089	3·9
7	Glenella, Man.	W. J. F.	Mar. 5.	·05	·383	·0972	202·0
8	Gloucester, Ont.	J. O'C. No. A.	" 9.	5·735	·203	·202	319·8
9	" "	" " B.	" 9.	1·45	·107	None.	349·0
10	Shelbourne, Ont.	R. A. R.	" 23.	·105	·073	·065	·1
11	Abbotsford, Que.	Wm. C.	" 27.	Free.	·054	1·672	16·4
12	Orange Ridge, Man.	R. C.	" 29.	.....	.....	.....	960·0
13	McKenzie, Man.	W. W.	April 2.	·036	·266	·0099	·1
14	Beachburg, Ont.	J. D.	" 6.	1·545	·75	·088	11·0
15	Pilot Mound, Man.	A. B. W.	" 23.	1·695	·197	None.	85·0
16	Millerton, N. B.	F. P. E.	May 23.	·01	·068	·527	4·0
17	Vankleek Hill, Ont.	H. D.	June 4.	·645	·10	·0288	10·0
18	Peachland, B. C.	R. H. H.	" 11.	·036	·021	·063	·4
19	Sweetsburg, Que.	R. D. W.	" 14.	·012	·054	1·06	None.
20	Pleasant Valley, Ont.	J. H.	" 22.	·012	·23	5·77	51·0
21	Bathurst, N. B.	T. M. B.	" 25.	·032	·069	·023	320·0
22	Alexander, Man.	T. S.	July 3.	·616	·228	·392	560·0
23	Ottawa, Ont.	W. L. S.	" 8.	·024	·205	·0856	1·2
24	Chatham, N. B.	J. N. No. 1.	" 15.	·048	·03	·0329	650·0
25	" "	" 2.	" 15.	·008	·02	·023	660·0
26	" "	" 3.	" 15.	·022	·026	·0115	80·0
27	" "	" 4.	" 15.	·024	·063	·0675	48·0
28	Pictou, N. S.	W. M. D.	" 15.	·172	·093	·0593	9700·0
29	Barrie, Ont.	W. A. R.	" 22.	·036	·11	2·157	12·8
30	Brampton, Ont.	W. F. J.	" 24.	·014	·088	2·608	84·0
31	Arnprior, Ont.	A. R.	" 24.	·012	·044	·507	None.
32	Ville Marie, Que.	F. D.	" 25.	·066	·143	4·40	13·8
33	Toronto, Ont.	S. H. J.	" 26.	18·12	·505	·885	26·8
34	Lavant Station, Ont.	Thos. L.	" 27.	·072	·548	8·149	240·0
35	Brome Corner, Que.	F. H. P.	" 27	·02	·04	·105	·8
36	Summerside, P. E. I.	L. B. H.	" 29	·012	·036	5·40	39·8
37	Niagara, Ont.	A. B.	Aug. 2.	·31	·054	·278	420·0
38	Britannia on the Bay, Ont.	A. L.	" 10	·275	·208	0304	10·8
39	St. Catharines, Ont.	F. B.	" 14.	7·625	·168	None	72·0
40	Newcastle, Ont.	Wm. R.	" 17.	·016	·119	15·14	94·5
41	Bideford, P. E. I.	Wm. R.	" 22.	·016	·093	14·91	67·0
42	" "	J. R.	" 22.	·02	·038	10·57	82·0
43	Port Sydney, Ont.	A. L. F. B. No. 1.	" 29.	·128	·232	·813	8·0
44	" " "	" 2.	" 29.	·12	·172	2·826	9·0
45	" " "	" 3.	" 29.	·08	·236	·092	10·5
46	Knowlton, Que.	Hon. S. F.	" 30.	None.	·106	None.	·7
47	Ripon, Que.	J. T. No. 1.	Sept. 19.	·096	·168	·035	3·0
48	" "	" 2.	" 19.	·626	·073	·017	920·0
49	Woodman's Point, Westfield, N. B.	F. H. J. R.	" 26.	·076	·022	2·261	44·9
50	Rideauville, Ont.	D. M.	" 26.	·730	·318	None.	5·2
51	Bloomfield Station, N. B.	W. S. S. W.	Oct. 1.	None.	·024	None.	5·8
52	Chatham, N. B.	W. S. L.	" 1.	None.	·052	1·538	20·0
53	Rossland, B. C.	A. J. Mc.	" 9.	·102	·093	·056	3·0
54	Headingly, Man.	H. A. W.	" 25.	2·41	2·51	·0494	4110·0
55	Summerside, P. E. I.	P. P. Co. No. 1.	Nov. 4.	·074	·112	3·562	25·0
56	" "	" 2.	" 4.	·026	·05	6·55	52·9
57	" "	" 3.	" 4.	Trace.	·02	2·314	13·4
58	" "	" 4.	" 4.	None.	·09	4·653	27·0
59	" "	" 5.	" 4.	·63	·82	4·208	26·1
60	" "	" 6.	" 4.	None.	·046	4·809	37·5
61	Thornhill, Ont.	D. J. No. 1.	" 9.	·06	·27	5·213	67·0
62	" "	" 2.	" 9.	·185	·225	12·05	145·0
63	" "	" 3.	" 9.	·555	·405	·0782	6·5
64	Orton "	E. L. C.	" 22.	·288	·156	1·795	1·9

SESSIONAL PAPER No. 16

WELL WATERS, 1901.

PARTS PER MILLION.

Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.	Number.
2390·0	1995·2	394·8	H. traces	Contaminated and unwholesome	1
6135·6	5594·8	540·8	V. H. traces	Very suspicious—Strongly saline	2
299·6	191·6	108·0	H. traces	Probably contaminated	3
5533·0	5269·0	264·0	H. traces	Saline water	4
313·2	254·4	58·8	None	Free from all organic pollution	5
341·2	198·8	142·4	H. ppt	Polluted and dangerous to health	6
7101·0	5708·0	1393·0	None	Saline water	7
5524·0	5288·8	235·2	Traces	Strongly saline	8
1257·0	1133·0	124·0	Traces	Saline water	9
252·0	152·8	99·2	V. Sl. traces	Probably free from contamination	10
324·0	244·0	80·0	Traces	Suspicious	11
6276·0	5880·0	396·0	Traces	Strongly saline	12
411·2	145·6	265·6	V. H. traces	Not polluted	13
460·0	258·4	201·6	H. ppt	Seriously contaminated	14
3000·0	2635·0	365·0	None	Saline water	15
50·5	29·0	21·5	Traces	Free from all injurious contamination	16
302·0	215·0	87·0	H. traces	Suspicious	17
87·5	58·0	29·5	Traces	Pure and wholesome	18
102·0	69·5	32·5	Traces	Safe and wholesome	19
388·0	250·0	138·0	Sl. traces	Seriously polluted	20
686·5	567·5	119·0	None	Free from organic impurities	21
4900·0	3796·0	1104·0	Traces	Saline water	22
62·0	23·0	39·0	None	Pure and wholesome	23
1175·2	993·2	182·0	Traces	Free from organic impurity	24
1156·8	1006·4	150·4	Traces	" " "	25
231·2	199·2	32·0	Traces	" " "	26
182·4	116·4	66·0	V. Sl. traces	" " "	27
16744·0	16309·0	435·0	Sl. traces	Saline	28
240·8	154·4	86·4	Traces	Decidedly suspicious	29
890·0	676·0	214·0	V. Sl. traces	" "	30
388·0	96·8	291·2	V. Sl. traces	Free from organic pollution	31
134·4	50·4	84·0	None	Dangerously polluted	32
443·6	251·2	192·4	H. traces	Very seriously contaminated	33
1264·8	787·2	477·6	Traces	Contaminated and unwholesome	34
82·8	54·4	28·4	None	Free from organic pollution	35
358·4	222·4	136·0	H. traces	Seriously contaminated	36
1054·8	999·6	55·2	None	Of doubtful purity	37
208·8	148·0	60·8	Sl. traces	Contaminated	38
1094·4	.....	.....	H. ppt	Polluted with drainage	39
831·2	540·0	291·2	None	Seriously contaminated	40
529·0	252·0	277·0	Traces	Highly suspicious	41
463·0	251·0	212·0	V. Sl. traces	Seriously polluted	42
133·0	97·0	36·0	None	Highly suspicious	43
105·6	68·0	37·6	Traces	Seriously contaminated	44
84·5	53·5	31·0	None	Good and wholesome	45
128·0	82·0	46·0	Traces	Excellent	46
128·0	91·0	37·0	Traces	Pure and wholesome	47
1592·5	1517·5	75·0	H. traces	Saline water	48
287·0	198·0	89·0	Sl. traces	Very suspicious	48
236·0	146·0	90·0	Traces	" "	59
167·0	122·0	45·0	Traces	Pure and wholesome	50
80·8	60·8	20·0	Sl. traces	Not contaminated	51
243·2	164·0	79·2	V. H. traces	Probably polluted	52
10319·6	9005·6	1314·0	None	Saline water	53
218·4	172·0	46·4	None	Suspicious	54
386·4	312·0	74·4	None	"	75
159·2	125·6	33·6	V. H. traces	"	56
264·0	213·6	50·4	Sl. traces	"	57
251·2	212·8	38·4	Traces	"	59
235·6	220·8	44·8	V. Sl. traces	"	60
472·8	392·8	80·0	V. H. traces	Seriously polluted	61
1222·4	942·4	280·0	V. Sl. traces	" "	62
347·2	268·8	78·4	Traces	Decidedly suspicious	63
198·8	139·2	59·6	Traces	Contaminated	64

From our own correspondence, and from the attention given in agricultural meetings and by the press, we are convinced that every year marks a more lively interest in this question of pure water upon the farm. There is no doubt that the number of farmers placing the base or source of their supply at a safe distance from possible pollution is steadily on the increase.

Nevertheless, there are still many who exhibit a complete apathy on this vital question, and it is to these we would appeal. If there are reasons to suspect the water —indications of contamination in smell or appearance—they should not be disregarded. It is quite possible that the well is receiving pernicious drainage from barn-yard, stable or privy. Neglect in this matter may mean jeopardizing the health of the farmer and his family, not to speak of troubles of various kinds in the dairy and cheese factory.

A number of the waters received from Manitoba and the North-west Territories, as well as from certain districts in other provinces, have been shown to be strongly saline. In the report of this Division for 1893, the results of certain experiments towards the improvement of saline waters are recorded. It is there shown that when the chief saline constituent is Epsom salts (magnesium sulphate) purification to a large extent may be effected by the judicious use of lime-water. For the preparation of a potable water from those containing sulphate and chloride of sodium (Glauber's salt and common salt) it will be necessary to have recourse to distillation, no method of filtration or precipitation for such waters being practicable. There are now upon the market several small stills that can be used on the kitchen stove and require but little attention. We cannot speak from personal experience of these household stills, but there is no apparent reason why they should not prove effective, yielding at but little, if any, extra expense a sufficiency of good palatable drinking water for the household.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(James Fletcher, LL.D., F.R.S.C., F.L.S.)

1901.

Ottawa, December 1, 1901.

Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to hand you, herewith, a report on some of the more important subjects which have received attention in the Division of Entomology and Botany during the year 1901. Many other subjects which have taken up some of the time of my assistants and myself need not be treated of specially in this annual report. The large numbers of applications for information and assistance made to the officers of the Division by agriculturists, horticulturists and others, continue to give encouraging evidence, not only of the usefulness of the investigations which are being carried on year by year, but also of the increasing appreciation of this work by the public in all parts of the Dominion. Of necessity a large proportion of the correspondence relates to the common, and therefore the more important, crop pests, concerning which serviceable advice can be given promptly. In this way much loss in many crops has been avoided.

Correspondence.—The large correspondence of the Division has been of a very varied character. From November 30, 1900, to November 30, 1901, the number of letters, exclusive of circulars, registered as received, is 3,058, and the number despatched 2,840.

Meetings Attended.—Meetings of farmers, dairymen, fruit-growers, &c., have been attended whenever other official duties would allow of my absence from Ottawa. Addresses were delivered at the following places :—

January 21-22, Kingston, Ont.—A meeting at Queen's University to discuss the importance of Forestry to Canada. Addresses were also given by the Hon. R. Harcourt, Minister of Education for Ontario ; Prof. B. E. Fernow, of Cornell University, and others.

January 31, Huntingdon, Que.—Pomological and Fruit Growing Association of the province of Quebec : 1. Injurious insects. 2. Can bees injure fruit ?

February 12, Toronto.—Toronto Horticultural Society : Insect Enemies of the Garden. Toronto Normal School : Nature Study.

March 19, Ottawa.—Select Standing Committee on Agriculture.

April 2, Ottawa.—Ottawa Normal School : Nature Study.

April 18, Smith's Falls, Ont.—Horticultural Society : Injurious Insects. Smith's Falls Public School : Nature Study. Smith's Falls High School : Nature Study in Education.

February 19, Perth, Ont.—Perth Public Schools : The Value of Nature Study and the Pleasures of Horticulture. Perth Horticultural Society : The Importance of Nature Study and Science in Horticulture.

June 6, Vars, Ont.—Public schools and farmers of the district : Nature Study and Science in Farming.

July and August.—Farmers' meetings in the West.

September 13, Buffalo, N.Y.—National Bee-keepers' Association and American Pomological Society : Address on Bees as Fertilizers of Flowers.

October 25, Gypsum, Ohio.—Special meeting of farmers : The San José Scale and the way to fight it.

November 13, London, Ont.—The Entomological Society of Ontario : 1. The Ohio and Ontario Experiments against the San José Scale. 2. The Value of Nature Study in Education. 3. Injurious Insects of 1901.

November 15, Toronto.—Toronto Branch of the Entomological Society of Ontario: The San José Scale in Ontario.

Fodder plants.—The experiments with grasses of all kinds and fodder plants have been continued upon the Central Experimental Farm, and, as in the past, have been a source of much interest to visitors. The summer of 1901 was exceptionally favourable for the growth of all grasses, and the varieties under cultivation succeeded well and made the Experimental Grass Plots a most attractive feature of the farm. In addition to the small plots of one square rod each, larger plots of the more desirable varieties were grown. The Awnless Brome Grass, introduced into Canada by the Experimental Farms in 1887, justly continues to increase in popularity ; it has proved a lucrative crop for seed growers and provides stockmen of the West with a prolific source of grass and hay. McIvor's Rye-grass, or Western Rye-grass (*Agropyrum tenerum*, Vasey), a native of the prairie regions, is also a most valuable grass, and is now much cultivated for its rich and heavy crops of hay and seed. Many packets of seed of these two grasses have been distributed to farmers and have given great satisfaction.

Reclaiming Sand Hills.—As was mentioned in my report for 1898, experiments are being carried on at the request of Dr. T. Christie, M.P., near Lachute, Que., in reclaiming a large tract of shifting sand now nearly 1,000 acres in extent. Among the plants used for this purpose, the White Spruce, Norway Spruce, Balsam Fir, White Pine, willows, Awnless Brome Grass and Quack Grass have been tried. The work as yet has been on too small a scale for marked results. A visit was paid on November 5 to the locality with you and Dr. Christie and an examination made of the area invaded by sand. After the past moist summer many of the trees which have been planted were found to have thrived satisfactorily, but the grasses had not done so well. Judging from the success of these trees, it is sincerely to be hoped that experiments on a more extensive scale may be carried out at an early date. The farmers living on the margin of this area of sand have shown much interest in the reclaiming of the land, have planted trees at considerable individual expense, and have taken good care of such trees as they were provided with.

Collections.—The collections of insects and plants in the Division have been very materially increased during the past year, and great progress has been made in building up a serviceable working collection. Many specimens in all orders of insects have been mounted and placed in the cabinets. Mr. Arthur Gibson, my second assistant, has done much of this work of arrangement and preparation of the specimens. Many larvæ of Lepidoptera and phytophagous Hymenoptera have been inflated and form a most interesting and valuable addition to the collections in those orders. A great many botanical specimens of Canadian plants have been mounted and deposited in the herbarium where they are now available for reference. This work is now being

pushed forward, and during the present winter I hope to have all the collections rendered much more complete than has been heretofore possible. The herbarium is in charge of the Assistant Entomologist and Botanist, Mr. J. A. Guignard. The Division is indebted to several correspondents for valuable donations of specimens. Every specimen in the collection is labelled with the name of the collector, the date when collected and the locality. Large collections of rare specimens have been generously given by the following :—

Rev. G. W. Taylor, Wellington, B.C.—Vancouver Island Lepidoptera and Coleoptera.

Mr. J. W. Cockle, Kaslo, B.C.—Many specimens of moths, butterflies and a few specimens of other orders, taken at Kaslo, on Kootenay lake, also the eggs of Lepidoptera for rearing.

Mr. W. C. Sandercock, Lauder, Man.—Manitoban insects.

Mr. A. J. Dennis, Beulah, Man.—Manitoban moths.

Mr. T. N. Willing, Regina, Assa.—North-west insects of several orders from Assiniboia and Alberta.

Mr. W. McIntosh, St. John, N.B.—Moths and butterflies from St. John.

Mr. F. H. Wolley-Dod, Calgary, Alta.—Some rare butterflies from Alberta.

Mr. N. Criddle, Aweme, Man.—Botanical specimens and paintings of Manitoban plants and insects.

Mr. J. M. Macoun, Ottawa.—A collection of Canadian violets.

Mr. J. R. Anderson, Victoria, B.C.—Many rare British Columbian plants not previously represented in the herbarium.

Mr. John Tolmie, Victoria, B.C.—Rare British Columbian plants.

Mr. Beverley McLaughlin, White Horse, Y.T.—A small collection of rare and well prepared plants from Yukon Territory.

Miss E. Blackman, Kaslo, B.C.—Rare plants from Kaslo, including one species, *Hemieva violacea,* never previously collected in Canada.

Mr. W. Herriott, Galt, Ont.—Specimens of Canadian grasses, many of them not previously represented in the collections.

Mr. Percy J. Shaw, Berwick, N.S.—A collection of Nova Scotia weeds made in Pictou county.

Mr. Henry Bird, Rye, N.Y.—Living caterpillars of *Hydræcia* moths sent for study.

During the year 1901, as heretofore, many entomologists and botanists in various parts of the Dominion have availed themselves of the services of the officers of the Division in identifying specimens of insects and plants. A large number of collections have been received for this purpose and by means of this work much valuable information as to the distribution of native insects, plants, and weeds of cultivated lands, has been recorded and many desirable specimens have been acquired for the museum.

Acknowledgments.—My thanks are gratefully tendered to the following for frequent and valuable assistance in the identification of specimens : Prof. John Macoun and Mr. W. H. Harrington, Ottawa ; Mr. E. M. Walker, Toronto ; Prof. J. B. Smith, New Brunswick, N.J. ; Dr. Howard and his able assistants, in the United States Division of Entomology ; Mr. W. H. Ashmead, Dr. H. G. Dyar, of the United States National Museum ; Messrs. B. T. Galloway, A. F. Woods and F. H. Chestnut, of Washington, D.C. ; Prof. F. M. Webster, of Wooster, Ohio ; Prof. L. R. Jones, of Burlington, Vermont ; and Mr. G. B. King, of Lawrence, Mass., all of whom are

eminent specialists in certain lines of study. I am also under obligation to my many correspondents who have notified me of outbreaks of injurious insects and assisted in carrying out experiments for controlling the same. Recognizing the great value of this assistance, I endeavour to give proper credit where it is due, when circumstances demand that the various subjects should be treated of at length in the annual reports. All records of observations in letters from correspondents are carefully preserved and made use of, either when received or at some future time. Every exact observation is of scientific value, and frequently small facts apparently of little importance at the time, provide missing links of great importance in working out the life histories of injurious insects and devising remedies for their control.

In conclusion, I have much pleasure in testifying to the assiduity and excellence of the work performed by my assistants, Mr. J. A. Guignard, B.A., and Mr. Arthur Gibson, in office hours or afterwards whenever required.

I have the honour to be, sir,
Your obedient servant,

JAMES FLETCHER,
Entomologist and Botanist.

Central Experimental Farm, Ottawa.

1. Plot of Awnless Brome Grass, Second Year (In centre of plate). 2. Part of Experimental Grass Garden.

NOTES ON LECTURING TOURS AND INVESTIGATIONS

IN MANITOBA, THE NORTH-WEST TERRITORIES AND BRITISH COLUMBIA IN 1901.

By instruction of the Honourable the Minister of Agriculture, and at the request of the several governments of Manitoba, the North-west Territories and British Columbia, I spent the months of July and August last in the West. In Manitoba the chief subject studied was locust injuries. In the North-west Territories a series of farmers meetings was held in northern Alberta in continuation of work of a similar nature which I have taken part in during the last three summers. The special subject for discussion was Noxious Weeds and their Eradication. In this work particular attention has been drawn to the great value of using light harrows and weeders on growing grain crops after they have appeared above the ground, also the value of Nature Study in Agricultural Education. In British Columbia insects injurious to field crops and fruits were dealt with as well as weeds, hay and fodder crops in general, and Nature Study.

Manitoba.

Leaving Winnipeg on the first of July in company with Mr. Hugh MacKellar, the Deputy Minister of Agriculture of Manitoba, and the Rev. W. A. Burman, I visited certain districts where serious inroads were being made into the crops by grasshoppers. A report on this investigation made to the Hon. R. P. Roblin, Minister of Agriculture for Manitoba, in which the main features of importance are dealt with, appears further on in this report. (See page 222.)

The North-west Territories.

After finishing the work in Manitoba, I proceeded westward. A most pleasant and profitable day was spent at the Experimental Farm at Indian Head, examining the crops and making other observations connected with my work. The exuberant appearance of all vegetation throughout the West this year surpassed by far anything which had ever been seen before since the settlement of the country, and the magnificent crop which has just been reaped confirms the hopes which were entertained by all classes at the time of my visit. July 10 was spent at Regina with Mr. T. N. Willing, the Territorial Weed Inspector for the North-west Territories, and an interesting drive was taken through the country surrounding the North-west capital, during which notes were taken as to the degree of prevalence of noxious weeds. The good work which has been done by the North-west Government in this connection, was very perceptible.

On the evening of July 10, I left Regina and reached Pense, where I visited Gatesgarth, the home of Messrs. Gerald and Bernard Spring-Rice. This is now a most interesting place, where successful experiments have been carried on for some years in advanced farming and tree-planting. The following day was taken up in examining the groves of trees, plantations of shrubs, fields of Brome Grass and other crops. The greatly enhanced beauty of this place, due to the enthusiasm and skill of the brothers Spring-Rice, the improvements and advanced methods practised, have for several years been an object lesson to the farmers of the district. My kind hosts spared no pains to make my visit profitable and enjoyable. On the evening of July 12, I reached Calgary and joined Mr. Angus Mackay. Leaving Calgary early on the

morning of July 13 with Mr. F. H. Wolley-Dod, I drove out with him to his stock farm 20 miles southward of Calgary, thus obtaining a good opportunity of seeing the crops and the country in this very attractive part of the Territories. On the morning of July 14, Col. Herchmer drove me out to see his farm on the Bow River, close to Calgary, a charming location where he has made many improvements. In the afternoon the Dominion Dairy Station and Cold Storage houses were visited with the Chief Superintendent, Mr. Christian Maerker; afterwards we went to see Mr. Wm. Pearce and were shown his experiments in growing trees, which he has been carrying on for several years with considerable success. On the morning of July 15, I left Calgary in company with Mr. Angus Mackay and Mr. George Batho, of the Nor'-west Farmer staff, by the Edmonton branch of the Canadian Pacific Railway to hold farmers' meetings along that railway. These meetings, for which arrangements had been made by the Department of Agriculture for the North-west Territories, were held at various places during the following two weeks, and the chief subject treated of by the speakers was the Eradication of Noxious Weeds. At all of these meetings the procedure followed was for Mr. Mackay to deliver the first address, in which he dealt with the chief features of the Experimental Farm work, which would be of interest in the locality, such as the experiments in eradicating weeds on dirty lands, the value of summer-fallowing for various purposes, the cultivation of grasses, the growth of trees and fruits, and the distributions made of trees and seed grain. He also pointed out the many ways in which the farmers of the North-west Territories could avail themselves of the benefits to be derived from the Experimental Farms, and assured them that he would always be pleased to assist them in every way in his power. Mr. Mackay's great knowledge of all branches of farming and his reputation as a reliable source of information on these matters proved a great attraction to the farmers in all the places where meetings were held. My own addresses were intended to explain concisely the nature of weeds in general, the losses due to their presence in crops, and the methods which had been found successful in combating them in various places with similar conditions of soil and climate. Particular attention was paid to those plants which were found to be prevalent in the different localities. Freshly gathered specimens were always collected before the addresses were delivered, which were found most useful in showing exactly what plants were being discussed. Large numbers of specimens were brought to the meetings by farmers wishing for information upon special weeds which they had seen or had found troublesome on their own farms. A few specimens were also taken with us of some of the worst weed enemies, such as Stink Weed, Larkspur, Sweet Grass, Wild Oats, &c., in case these might not yet have been introduced into the various districts, but of which it was most advisable that farmers should know the appearance and nature, so as to guard against them and attend to their destruction promptly, should they by chance be introduced. Mr. Batho placed us under a debt of gratitude by his kindness in collecting specimens and in creating an interest in the meetings in many other ways. The success of several of the meetings was also much enhanced by the presence and energetic help of Mr. T. N. Willing, of Regina, and of Mr. Percy B. Gregson, of Waghorn, Alta., the local Weed Inspector, who had taken great pains to make it known when and where these meetings were to be held.

Olds, July 15.—An excellent meeting, the first of the series, was held at this thriving little town, which is the centre of a rich agricultural district, settled largely by Americans from Nebraska and Germans from Ontario. Mr. Henry Briggs was in the chair, and gave an admirable address on experiments he had been carrying on in growing fall wheat and fodder plants. Awnless Brome Grass he had cultivated for seven years, and he had always found it most satisfactory in every way. White Clover had done well, and Alfalfa was promising. Fall wheat sown early on newly broken ground had succeeded best, but, when this grain was sown on well worked land, the crops were heavier, although they ripened later.

Innisfail, July 16.—Mr. F. M. Oldham in the chair. A well attended meeting. Awnless Brome Grass was a subject much discussed. Mr. Mackay referred to the fact that this grass was not so highly esteemed at Calgary and Pincher Creek as at other places in the Territories. He had found it excellent in every way at Indian Head and considered the hay the best he had grown for horses. The seed could be sown at any time, but he preferred sowing directly after seeding spring grain without a nurse-crop, as there is not enough soil-moisture at Indian Head to support both crops to the best advantage. He attributed some of the failures in the Calgary district to too heavy seeding ; 8 or 10 lbs. of seed per acre was the proper quantity to sow. There was no difficulty in eradicating Brome Grass if the work was done properly. The sod should be broken 2 or 2½ inches deep during hot weather in June and back-set in August. To prevent the blowing away of surface soil, which was a trouble in some parts of the North-west, Brome Grass and Western Rye-grass were of great value. In his experiments he had found that wheat did best on Western Rye-grass sod, and oats and barley on Brome sod. One crop of Brome Grass would provide fibre in the soil for three or four crops of wheat or other grain. An animated discussion was held on the weed question, and Mr. Mackay paid a high tribute to the good farming of Mr. Henry Briggs, whose farm he had visited the previous day and had found to be one of the cleanest farms he had seen in the Territories ; this farm showed what could be done by good work. A large collection of weeds was examined and the characters of each were explained. The value of summer-fallowing for the purpose of clearing land of weeds was pointed out. This should be done early and followed by not more than three or four cultivations so as to allow seedlings time to germinate. It was quite possible to cultivate land so frequently in hot weather that the germination of seeds could not take place, and the land would be left almost as dirty as when the work was begun.

Mr. Gregson compared the condition of farms in the Innisfail district this year and last. He also showed examples of Stink Weed and Canada Thistle collected in the locality and warned farmers against allowing these troublesome pests to spread.

Red Deer, July 17—Mr. A. Cole in the chair. The meeting was small, owing to another important meeting on school matters being held at the same time. Among weeds brought to the meeting by Mr. Gregson were samples of Canada Thistle, four feet high ; Stink Weed, two feet ; Shepherd's Purse, 18 inches ; Larkspur, five feet ; Wormseed Mustard, three feet, and Gray Tansy Mustard, four feet. Red Deer is an older settled district than some others in northern Alberta ; the settlers from Innisfail and Red Deer to Lacombe are chiefly from Ontario.

Strathcona.—This thriving town, formerly known as South Edmonton, was reached on the evening of July 18, which was marked by an unusual phenomenon for the locality, a furious hail storm, which, together with two preceding storms at recent date, had worked great havoc on the crops and all other vegetation. A meeting was held at 2 o'c., of 19th, Mr. McLean in the chair. Mr. McIntyre, the secretary, had worked up the meeting well, but other interests prevented a very large attendance. Mr. Mackay spoke of summer-fallowing, and much interest was evinced in weeds. Farmers were warned against Ball Mustard (*Neslia paniculata,* Desv.), which was the most prevalent weed noticed in grain fields from Calgary to this point. Mr. T. N. Willing spoke of the necessity of farmers in the Edmonton district taking more pains to clear weeds from their crops, particularly from oats. Mr. George Batho exhibited samples of Russian Pig-weed (*Axyris amarantoides,* L.), which was spreading rapidly through the Territories, particularly along lines of railway. It is a bad weed of vigorous growth, with hard wiry stems, which are difficult to cut. In the winter it becomes a tumble weed.

Clover Bar, July 20.—Mr. Daly in the chair. Leaving Strathcona at 10 o'clock, we drove over roads, bad, owing to late rains, to Clover Bar, a very thriving district

where a good meeting was held. The farmers were very hopeful, regarding the recent hail storms as quite exceptional occurrences not likely to happen again. Ball Mustard and annual weeds were much discussed. Mr. Mackay recommended that early summer-fallowing should be practised in connection with mixed farming. Plough deeply, 7 or 8 inches, if possible, before June 1, and at any rate before July 1. Harrow at once and cultivate three or four times, not more. Sow oats or barley for feed the first year, and cultivate, but do not plough again. In the second year sow Red Fife wheat, seeding two weeks after spring opens. If oats are sown, plough once, and sow two weeks later than wheat. Brome and other grasses may also be used as cleaning crops.

Fort Saskatchewan, July 20.—Leaving Clover Bar at 4.30, we drove to the old settlement of Fort Saskatchewan, where a most successful meeting was held the same evening. It was pointed out that many weeds were by far too noticeable in the crops seen along the road. The most noxious of these were shown, and methods for their control were given. Both here and at Clover Bar much inquiry was made about Sweet Grass (*Hierochloa borealis,* L.). The chief cause of its persistence was found to be that settlers had been calling it by the wrong name, viz., 'Twitch grass,' and treating it accordingly. 'Twitch Grass,' or 'Scutch Grass,' is a shallow-rooted perennial requiring shallow ploughing, whereas Sweet Grass roots deeply and requires as deep ploughing as possible, the very opposite treatment to that which it had generally received. In both cases, the land should subsequently be put under a smother crop, such as a thick seeding of oats or barley to be cut for feed as soon as ready. The best time to cut oats for hay is when they are in blossom.

Mr. Mackay again pointed out the value of summer-fallowing as a weed clearing process and advised the practice at least once in three years. Leaving Fort Saskatchewan early on the morning of July 21, we drove in to Edmonton and spent the day there.

Leduc, July 22.—This is a new settlement, peopled for the most part by Americans, Russian Germans and Canadians from Ontario. It rained nearly all day, and, owing to the state of the roads, few farmers could come in to the meeting. An informal meeting was held in the Leland hotel, a nice clean house, kept by Mr. Willis. The afternoon was spent making botanical collections, several interesting specimens being secured.

Wetaskiwin, July 23.—Mr. J. McVicar in the chair. This is a new place, settled mainly by Swedes, Germans and Americans. An enthusiastic meeting was held in the afternoon with a prolonged discussion on summer-fallowing, the best time to sow, and the quantity of seed grain to the acre. Awnless Brome Grass was recommended. Speaking of the value of this hay, Mr. Mackay stated that he had obtained as good results in feeding the straw of this grass, from which the seed had been threshed, as from any other hay. Some difficulty having been experienced in knowing the proper time to cut Brome for seed, it was explained that this should be done when the seed was of about the same consistency as wax. At Indian Head, Brome Grass flowered about July 1, when the fields presented a golden yellow appearance from the copious pollen-bearing anthers ; three weeks later than this the seed would be ripe enough to cut and the fields would be of a purplish hue. Cutting should not be delayed too long or much seed would be lost. When the seeds on a few heads would shell out, the crop should be cut. An acre of Brome Grass would give from 400 to 800 pounds of seed and an average of 2½ tons of hay. The crop would depend largely on getting good rains in May. Well cleaned Brome seed would always fetch at the lowest figure 10 cents per pound. Four crops of Brome Grass could be taken from one seeding, but the best management was to take two crops of hay and then use the field as pasture for two years.

Ponoka, July 24.—Mr. Alger in the chair. A large meeting was held here. Ponoka is beautifully situated on the banks of the Battle river with rich rolling land around it, which has been settled by progressive Canadians from the East and Americans. Much interest was taken in the subjects treated of by the speakers. Summer-fallowing early was highly recommended by Mr. Mackay for cleaning land of weeds. It had been noticed that very few of the summer-fallows to the north of this place had been ploughed at the present time, and yet the seeds of many weeds, such as Shepherd's Purse, False-flax, Pepper grass, Stink Weed, where it occurred, and some others were already ripe. It was claimed that summer-fallowing, as advised, in these rich moist lands, would make the crops late and give too much straw. Mr. Mackay advised heavier seeding, viz., 2 bushels of wheat, and 2½ bushels of oats ; this was more seed than was used at Indian Head, where they found that 1½ bushels of wheat and 2 bushels of oats to the acre gave the best results. Great stress was laid on the importance of sowing clean seed as a means of reducing weed presence; Mr. Mackay believed that the success he had secured at Indian Head in keeping their land free of weeds was very largely due to the care taken in cleaning seed grain. Summer-fallowing however, he considered essential if the rich lands of the West were to be kept free of weeds. Lateness of the crop grown on such land and too luxuriant a production of straw might be prevented by the following method. Fallow by ploughing deeply as soon after seeding time as possible, harrow to start the weeds. Three weeks will give the weed seeds near the surface a chance to germinate ; cultivate these 2½ inches deep and repeat the operation 3 times. This will destroy four crops of weeds. Next spring harrow early, leave the land till the 1st of June, then sow a grain crop to be cut for green feed in the first week in August. After cutting this, plough 2½ or 3 inches deep and sow wheat the next spring. If the land is still thought to be too weedy, two crops of grain feed may be taken. If the land is not very weedy drill in wheat 2½ inches deep without cultivation, and, when it is one or two inches high, run over it with a weeder or light harrow. Brome Grass and Western Rye-grass were discussed, and the proper seeding of each of these was stated to be 10 pounds to the acre. Western Rye-grass provides excellent pasture and hay, but the latter must be cut when in bloom ; the straw from which ripe seed has been threshed, is almost useless. The difference between Awnless Brome (*Bromus inermis,* L.) and the native Western Brome (*Bromus Pumpellianus,* Scrib), was explained to be that, of the former, the stems and leaves are perfectly smooth and the chaff scales bear no spike-like awns, while in the native species, which is also a luxuriant and very valuable grass, the leaves and stems, particularly at the joints, are always more or less hairy and the chaff bears a short sharp awn.

Earnest inquiries were made as to whether plums and apples would be likely to succeed in the district, and mention was made of the successful experiments which have been carried out at the Experimental Farms in selecting desirable forms of the native plum and in improving the hardy Siberian crab apple (*Pyrus baccata,* L.) by crossing it with the best varieties of hardy apples. Some fall wheat which would have been ripe in about two weeks, was shown at this meeting, and Mr. George Batho spoke of the success in growing this grain in the district.

Lacombe, July 25.—Mr. F. B. Watson in the chair. A splendid meeting was held at this thriving and active town. The meeting had been well worked up by Mr. Percy Gregson, and the farmers brought in a large number of specimens of weeds and other plants concerning which they desired information. Col. J. J. Gregory contributed many plants of interest and took a leading part in the discussions, bringing forward many subjects which he knew to be of special interest in the locality. After the meeting broke up, it was carried on informally for nearly another hour by those present who wished to make the most of the opportunity to discuss various farming matters with the speakers. Mr. Gregson spoke at length of the efforts being made by the Hon. G. H. V. Bulyea to help the farmers of the North-west in their fight against

noxious weeds and of the excellent work which had been done by Mr. T. N. Willing, the Territorial Weed Inspector. Specimens of Stink Weed, Canada Thistle, Ball Mustard, Wild Mustard, and Bird Rape (or Smooth Mustard) were exhibited.

During the evening a visit was paid to Mr. Howell's beautiful garden, where everything was growing in the greatest luxuriance.

On the morning of July 26, we drove out to see Col. Gregory's farm, and particularly a good patch of Alsike clover. Here we found many things of interest—a fine patch of Brome Grass, grown from a small sample of seed sent from Ottawa three years previously ; a field of spelt wheat, very fine turnips and a nice grove of native trees, spruce, aspen and birch, which have grown remarkably well in the seven years since they were planted, also two kinds of native currants (*Ribes Hudsonianum,* Rich., and *Ribes floridum,* L'Hér.).

Leaving Lacombe at noon, we reached Calgary at 7 p.m., and I left the same night for British Columbia to examine some of the districts which were last year devastated by the Variegated Cutworm, and to hold meetings with Mr. J. R. Anderson at several places where Farmers' Institutes had been formed.

British Columbia.

I reached Revelstoke at 2.30 p.m., July 27, and Nelson at 7.30 on 28th idem. A night and part of the following day were spent at this picturesquely situated little town on the shore of Kootenay Lake, and at 4 o'clock in the afternoon I took the steamer *Kokanee* for Kaslo, which place I reached in the evening. I was met there by Mr. J. W. Cockle, an enthusiastic naturalist, who has been of great assistance to me by collecting insects and plants and by sending information concerning injurious insects. Before dark, I was able to call and see Mr. George Alexander, a great lover of flowers, and to go over his most beautiful flower garden. I had heard previously of Mr. Alexander's success in floriculture, but was little prepared for the blaze of colour and the large number of choice plants which were to be seen in his grounds. After passing the night with Mr. Cockle, and examining his extensive collection of insects, he kindly took me to visit several gardens in the upper town, where heavy crops of all kinds of fruit were seen. While at Kaslo, I had the pleasure of meeting Miss Ethel Blackman, a botanist, who has contributed many rare and highly valued specimens of plants to the herbarium of the Division. I left Kaslo at 10 o'clock, July 30, and took the train to Sandon. The scenery up this railway to Sandon and down again to Nakusp on the Arrow Lakes, is extremely grand. After a delightful trip by boat up the Arrow Lakes to Arrowhead, the train was again taken and the night passed at Revelstoke. Vancouver was reached during the night of July 31, and I proceeded the next day to Nanaimo.

A series of meetings of Farmers' Institutes was held during the month of August at various places on Vancouver Island, in the Fraser valley, the Nicola valley, and in the Okanagan valley. These meetings were arranged and all were attended by Mr. J. R. Anderson, the active Deputy Minister of Agriculture for British Columbia, who also ably fills the difficult post of Superintendent of Farmers' Institutes for the whole province. The Farmers' Institute is a much newer development in British Columbia than in the older provinces, and many districts have not yet organized themselves into institutes. Where, however, organization has been effected, the members appreciate very fully the advantages to be derived from the system. Farmers come to the meetings knowing what they want, and are prepared to put their views plainly before the meeting and get the opinion of others upon subjects of general interest. The province has a most useful and painstaking officer in the Deputy Minister, who makes a point of attending officially all meetings whenever possible, and the farmers in that way have frequent opportunities of bringing their wishes directly before an executive officer of the Government. The Central Farmers' Institute is firmly established, and the annual meeting is well attended by delegates from all parts of the

province. This meeting is held in the autumn. Ever since the establishment of the institutes, special speakers have been provided by the provincial Government to address the meetings upon agricultural subjects at each place at least once or twice a year. In this way, the farmers of the Pacific province have had an opportunity of hearing some of the best institute workers of the East. Among others, series of several meetings have been held during the last four years, by Messrs. Shutt, Gilbert, Robertson, Hodson, Stewart, Maerker, Ruddick, Drummond, Raynor, &c.

Comox, August 2.—The first meeting was held at Courtney, near that place. There are few spots better suited to dairying than this. Most luxuriant crops of hay and other fodders are grown, and the pastures are excellent. A butter factory has been lately established, and is doing well. Fruit is also grown to advantage.

The meeting was well attended and an animated discussion took place. After the meeting we drove to Union Mines. The following day was spent in the Beaufort range of mountains, collecting botanical and entomological specimens. Mr. Walter Anderson accompanied us on this trip and discovered a species of *Rubus* (*R. nivalis* of Howell's Flora), new to Canada. Leaving Union early August 4, a most delightful drive of 42 miles through the forest was taken to Parksville, where we were most hospitably welcomed and entertained by Mr. and Mrs. R. F. Hickey. Mrs. Hickey had collected several injurious insects, amongst which I found a few specimens of the Variegated Cutworm. We left Parksville on the morning of August 5, and drove 35 miles to Alberni, passing along the beautiful Cameron Lake and through the wonderful forest at the base of Mount Arrowsmith. We arrived at our destination at 5 o'clock.

Alberni has an active institute, and a good meeting was held at 8 o'clock the same evening. Great interest was evinced in the proposed action of the Department to assist farmers in the very heavy and expensive work of clearing away the stumps of the gigantic trees which are characteristic of that part of Vancouver Island. It was announced by Mr. Anderson that his Minister had made arrangements by which gunpowder of the most suitable kind would be provided at half the price they could get it themselves, if they would conform to certain conditions. There was an animated discussion on the weeds of hay lands and pastures. My own address was on the great importance of the new educational movement known as Nature Study, which I claimed must be of inestimable value to farmers ; in fact, I consider Nature Study is the common sense of education, whatever may be the chosen vocation of any schoolboy or girl, and this is more particularly true of farmers, for all their work has to deal directly with objects, a knowledge of which comes within the limits of natural history. Successful farmers are those who understand their business best. The farmer who knows how plants grow, feed, and develop, will best understand how to fight weeds, which crops are suitable for certain soils, the way to treat them, their requirements, and how they can be used to his own greatest advantage. A knowledge of zoology would be of great use to a farmer in caring for and breeding stock. With even an elementary knowledge of entomology, he could cope much better than the farmer of to-day with the many insect enemies which yearly destroy a large proportion of every crop. To illustrate this, I referred to Mr. Anderson's good work at the beginning of the cutworm outbreak last year, and showed that much loss had been avoided by his being able to advise promptly what should be done to check the caterpillars in their depredations.

The benefit of cultivating clovers and other nitrogen-gathering crops was explained, the best time to cut hay, and the advantage of a proper rotation of crops. Speaking of the great interest now being created in forestry by the new Canadian Forestry Association, I urged my hearers to do everything in their power to preserve the magnificent forest around Cameron Lake, within a few miles of Alberni, which I had driven through when coming to the meeting, and which I believe is one of the finest pieces of standing timber in the world. The very size of the trees, as up to the present there are no railways there, would protect it for many years if they could only keep

out the greatest enemy of all—fire. There were few places where trees of from five to eight feet in diameter could be seen, as was the case there, by thousands. Everyone could do something to create an interest in this subject, if not, indeed, on occasion, to prevent fire from spreading. They were reminded that a single spark was enough to start a disastrous conflagration.

Starting at 5 a.m. on August 6, the ascent of Mount Arrowsmith, the highest mountain in that part of Vancouver Island, was begun. This expedition to the summit of this mountain was of great interest, and large collections of rare botanical and entomological specimens were made, as well as notes taken on the trees and other indigenous plants observed. At a height of about 4,000 feet grand groves of the Yellow Cypress (*Cupressus Nutkaensis,* Hook.) were found. Perhaps the most interesting plants collected were *Allium Nevii,* Wat., a pretty dwarf pink-flowered onion, a blue-flowered caulescent violet and *Calandrinia Columbiana,* Howell, a beautiful plant of the Purslane family, with large fleshy roots and showy pink flowers. The descent of the mountain was made on the afternoon of August 8, and a long drive of 55 miles taken the next day to Nanaimo.

Nanaimo, August 9.—A good meeting was held in this town at 8 o'clock in the evening, where, although the attendance was small, much interest was taken in the subjects presented. The discussion was upon the best crops to grow upon certain soils and on agricultural methods suitable for Vancouver Island. Grasses for hay and pastures were also discussed, and the disappearance of the Variegated Cutworm was much commented upon. Nanaimo was almost the only place in the province where any injury was done by this caterpillar in 1901. Leaving Nanaimo by train the next morning, Victoria was reached at 12.30.

Saanich, August 10.—A largely attended meeting was held at this place. By request, the subject presented was Nature Study in education and as affecting agriculture. Nature Study had recently been added to the regular curriculum of the public schools of the province. Many of the audience, including the leading school teachers from Victoria and the district, went out to the meeting by special train provided for the purpose. There was also a large attendance of farmers who joined heartily in the discussions.

The next day was spent in Victoria, and I had the honour of being shown some interesting experiments in tree culture by His Honour the Lieutenant Governor Sir Henri Joly de Lotbinière in his grounds near Government House.

On August 12, in the morning, I visited Cloverdale, the residence of Mr. John Tolmie, and spent a few hours examining his botanical collections, and interesting plants, which he has growing in his grounds. The afternoon was spent in the small but exceedingly well arranged and instructive museum of the Department of Agriculture. The herbarium, representing the flora of the province, made almost wholly by Mr. Anderson himself, is very complete and several other collections illustrative of the natural wealth of the province are here presented in such a way as to strike the mind of a visitor at once with the capabilities of the country. Among other things may be mentioned that at one end of a room stands a single mounted leaf of the bracken nine feet high. Above this along the ceiling is a single annual shoot of a bramble 12 feet long, and by the side of these a one-year's growth of a young plum tree 8 feet long.

Leaving Victoria by steamer at midnight, we reached Vancouver at 9 o'clock on the morning of August 13. Here I was met by Mr. Tom Wilson, the Government Superintendent of Fumigation, and I went with him and inspected the fumigating house where all imported nursery stock is fumigated for the destruction of the San José Scale, and found everything in perfect order. We left Vancouver at 1 o'clock by the Canadian Pacific Railway, and, proceeding to Harrison, crossed by steam ferry to Chilliwack.

Chilliwack, August 13.—The farmers of this fertile district always turn out in large numbers, and the last meeting was no exception. Insects injurious to fruit

crops were dealt with, and particular reference was made to the disastrous outbreak of the Variegated Cutworm in 1900. The farmers of the whole province are to be congratulated on the activity of the Department of Agriculture, and the prompt manner in which the best-known remedy, the bran and Paris green mash, had been brought before the country through the public press by the Deputy Minister. A tribute was paid to the agricultural and daily press for the way in which they always published at once any matter likely to be helpful to farmers, recognizing that anything which affected the prosperity of the farmer affected that of the whole community.

On August 14, we started on a collecting trip up Mount Ché-am. Driving 12 miles to Popcum, we called on Mr. Eb. Knight, who helped us very much in getting suitable guides, and by 9 o'clock we started on the ascent of this interesting mountain, which, rising from the level of the river 30 feet above sea level, runs up to a height of about 8,000 feet, and presents exceptional advantages for examining the fauna and flora of the various altitudes. The weather was magnificent, and large collections were made during the ascent. By 6.30 an extensive plateau at about 7,000 feet was reached, and camp was made for the night. This plateau is an undulating meadow stretching from where we came on to it for about a mile to a deep valley out of which Angel Peak or Mount Ché-am proper rises to the north, and Lady Mountain, flanked by Deer Ridge, to the south. This mountain meadow is one extended garden of exquisite beauty with the greatest variety of mountain flowers. Covering almost the whole surface of this elevated upland are dwarf bushes of the Mountain Blueberry (*Vaccinium Myrtillus*), not more than a few inches high in many places, but crowded with pink bells; here and there are large beds of crimson, green, and white Mountain Heather (*Bryanthus empetriformis, B. glandulíflorus* and *Cassiope Mertensiana*), of Purple Lupins (*Lupinus Nootkatensis*), Golden Groundsels (*Senecio aureus* and *S. canus*), Arnicas (*A. latifolia,* and *A. cordifolia*), white-flowered Valerians (*Valeriana Sitchensis*). There again tall wand-like spikes of *Veratrum viride* with handsome broad leaves and green flowers, standing up in a sea of waving grasses and sedges, dotted with the bright starry flowers of Mountain Fleabane (*Erigeron salsuginosus*), their delicate purplish flowers contrasting beautifully with dwarf Goldenrods (*Solidago multiradiata*, var. *scopulorum*). Potentillas (*P. fruticosa*), White-flowered *Spiræa pectinata* and blue-tinged Pentstemons (*P. confertus,* var. *cæruleo-purpureus*), with in some places the gorgeous scarlet tufts of a Castilleja and numberless golden-flowered Glacier-lilies (*Erythronium grandiflorum*). In low spots along streams of snow water, beds of bright yellow buttercups (*Ranunculus Eschscholtzii*), starry white flowers of *Caltha leptosepala* and the crimson spikes of the handsome mountain musk (*Mimulus Lewisii*) were seen. On flats wet with snow water, the delicate white flowers of *Claytonia sessilifolia* covered the ground in company with the bright yellow-flowered *Potentilla gelida.* In a boggy spot with a stream running through it were stiff tufts of mountain coltsfoot (*Petasites frigida*) and the delicate little *Mimulus luteus,* var. *alpinus*, with its hair-like stems and small leaves bearing very little resemblance to the typical species, pushed its large flowers above the icy cold saturated moss. On the upper slopes grew clumps of the silvery *Lupina hypoleuca,* the delicate mountain Hare-bell (*Campanula rotundifolia,* var. *alpina*) with its large blue flowers, *Aplopappus Lyallii* with blossoms of a bright orange, and *Troximon aurantiacum* of a variety with purple flowers. Higher up towards the peak *Phlox Douglasii, Pentstemon Menziesii,* and *Silene acaulis* were abundant, and, highest of all, *Smelowskia calycina.* The trees and shrubs most abundant on the upper levels were gnarled and stunted trees of *Tsuga Pattoniana* and an *Abies* like *grandis.* Both of these trees, however, when in protected valleys, even up near the summit between Angel Mountain and Lady Mountain, grew to great size, several trees being over three feet in diameter. Among the most noticeable shrubs were *Pyrus sambucifolia* with pink-tinged flowers, *Rhododendron albiflorum* with its delicate green tinted white bells, *Ribes laxiflorum* and dwarf mountain willows, *Salix commutata,* with handsome foliage, and perfect fruiting bushes of the minute *Salix nivalis,*

not rising an inch above the surface of the ground. It was remarkable that not a single strawberry plant was found on this mountain, although they are plentiful on the Vancouver Island mountains. Insect life was equally abundant with the vegetation. This sea of flowers was visited by swarms of mountain butterflies, *Melitæa anicia,* Db.-Hew., *Argynnis chariclea,* Schneid., *Lycæna aquilo,* Bdv., and *L. anna,* Edw., with *Parnassius clodius,* Men., in the valleys. The most interesting species found on Mount Ché-am is *Erebia vidleri,* Elwes, a species discovered in British Columbia 30 years ago by Captain Vidler, but of which nothing was known as to locality and date of capture. No other locality as yet is known than this mountain where I rediscovered it in 1898, and took three specimens in August. This year I took 13 on August 15 and Messrs. Tom Wilson and A. Bush took as many more. Large collections were made of insects in various other orders, which were brought back safely to Ottawa. We descended the mountain on August 16, and left on the 17th for the upper country, reaching Kamloops early on the morning of the 18th. On the 19th we drove 62 miles down the Nicola valley to Nicola Lake. On the way grass on the ranges, trees in coulees and crops at several places were found to be considerably injured by grasshoppers, mainly a species much resembling the Rocky Mountain Locust (*Melanoplus spretus*), and identified by Mr. E. M. Walker as *M. affinis.*

Nicola Lake, August 19.—A good meeting was held at this pretty little town. Injurious insects, locusts, cutworms, and fruit pests were the subjects of the address, and also Nature Study and the Value of Farmers' Institutes. Leaving Nicola Lake early on the 20th, before the sun got too hot for comfortable driving, we took breakfast at Mr. O'Rourke's hotel, Quilchena, and reached Kamloops by 7 p.m. We left again at 3 a.m. by rail, reaching Sicamous by 6 o'clock on August 21 and Enderby by 9 o'clock. The day was spent in collecting and packing our specimens.

Enderby, August 21.—The first meeting in the rich Okanagan valley was held at this place and was an excellent meeting. Grain crops, Brome Grass, and Injurious Insects were fully discussed, and many inquiries were made concerning weeds. Wild Oats are very prevalent in this valley. After the meeting several farmers waited and an informal discussion, which brought out many useful points, was continued for another hour. Leaving Enderby at 9 o'clock on August 23, the next stop was made at Armstrong, where I had the pleasure of examining Mrs. Walton's collection of insects, and then Mr. Walton kindly drove me to Vernon.

Vernon, August 22.—A meeting was held in the town hall in the afternoon, which was well attended. Fruit, grain and fodder crops were discussed, as well as their insect enemies. Rattlesnakes, which are not uncommon in the locality, were also a subject of debate. It was thought that the virulence of the poison of the variety occurring in this valley was not as great as that of those farther to the south. The Awnless Brome Grass had not succeeded as well here as it had in some other parts of British Columbia and in the Prairie Provinces.

After the meeting a visit was paid to Lord Aberdeen's ranch at Coldstream, where the capabilities of this fertile district are plainly visible. Good management and horticultural skill have combined to make this a model of what a successful fruit farm can be in this district.

Leaving Vernon on the morning of the next day, we took the steamer *Aberdeen* to Kelowna, reaching that place by 3.30. The afternoon was spent in collecting along the shores of Lake Okanagan and in the woods.

Kelowna, August 23.—This was the old Okanagan Mission, but the enterprise and activity of the members of the Kelowna Shippers' Union have made a new place of it. Here fruit of the best quality is produced in larger quantities every year, and every boat that leaves the wharf carries a freight of delicious fruit to less favoured localities. The suitability of the soil to produce an excellent quality of cigar tobacco is now well known, and a thriving cigar factory has been established, with expert makers of home-made and home-grown cigars, which are gaining favour daily over the whole Domin-

ion. The meeting was largely attended, and an interesting discussion took place on plant diseases and the weeds of the farm. Specimens were shown of the Leaf Spot of the tobacco, of diseased potatoes, and of Poverty Weed. The last named is a deep-rooted perennial, a native of alkaline lands, and a most difficult enemy to eradicate.

These meetings in British Columbia were satisfactory throughout, and the wish was frequently expressed that the speakers would soon return to hold similar meetings.

On the way home, stops were made for one day at Glacier and two days at Banff ; at both of these places we were favoured with magnificent weather and consequently large collections were made both of plants and insects. From Nepigon, Calgary, Mount Arrowsmith, Mount Ché-am, Glacier and Banff, parcels of living roots were despatched for cultivation in the botanic garden at the Central Experimental Farm.

Ottawa was reached at 5.30 a.m. on the first of September.

I beg gratefully to acknowledge the courtesy of the Superintendent of the western Division of the Canadian Pacific Railway, who gave me free transportation over all parts of the C.P.R. system during the above investigations.

DIVISION OF ENTOMOLOGY.

CEREALS.

The cereal crops of the Dominion this year made on the whole a good showing. Throughout the West the crop of all small grains, with the exception of oats, is unprecedentedly large and of good quality. The conditions in Manitoba and Assiniboia were far more favourable from the beginning than in 1900. The spring opened with fine weather, and there was little rain until the end of May. All farm work was therefore pushed forward. The ground was well charged with moisture from the rains of the previous autumn, and crops got a good start. In Alberta the weather was wetter, colder and more backward throughout the season than in Manitoba, Assiniboia and Saskatchewan, but throughout the Prairie Provinces the summer was showery, and magnificent crops were produced. In Alberta the excessive rain in spring caused some inconvenience by delaying seeding and haying. August was very fine and all crops rushed forward to maturity with remarkable rapidity so that, although harvest began in Manitoba about the usual date, August 18-20, it was only a week or ten days later in Alberta. The latter half of September was cold and wet with snow throughout the prairie region on the 22nd and 23rd. After this the weather turned very fine, crops picked up well, and all work was pushed rapidly forward. The average yields per acre of the more important cereals are as follows : From the Manitoba December Crop Bulletin, a publication of great accuracy :—Wheat, 25·1 bushels per acre ; barley, 34·2 ; oats, 40·3 ; rye, 23 ; peas, 18·6 ; flax, 12·7.

Mr. George Batho, of Winnipeg, has kindly supplied me with the following concerning the North-west Territories :—

'The yields in Assiniboia, Saskatchewan and Alberta were heavier than in Manitoba this year. Probably the most satisfactory crops were at Indian Head, Regina, Moose Jaw and other points in eastern Assiniboia. Throughout this district wheat must have averaged 33 bushels, and many kinds gave returns of 40 bushels. In Alberta a considerable amount of the crop was uncut when cold wet weather came in September ; this kept the yields from being as high as was at one time hoped for.

'The oat crop throughout the whole Territories was particularly good. The average for Assiniboia, Saskatchewan and Alberta can safely be put at from 55 to 60 bushels per acre. Some damage to oats, and in a smaller degree to wheat, was wrought by cutworms in Manitoba and in a few localities in the Territories. Grasshoppers also reappeared in the same localities as last year in Manitoba, and where not attended to destroyed a few hundred acres of wheat ; but their ravages affected very little the

grand crop of the whole province, and the farmers now know the habits of these insects and have learnt the best ways of fighting them.'

As to the eastern provinces, a general statement applies to all. The crops were good, with the exception of fall wheat in western Ontario, which was badly attacked by the Hessian Fly. The spring opened early with very favourable conditions for growth up to the beginning of July, when there was a period of excessive heat, followed in some parts of Ontario and Quebec, and in the whole of the Maritime Provinces, by a month or six weeks of drought, from which grain crops, hay and pastures, suffered in many places. Some injury was also done to barley and spring wheat by the Hessian Fly and drought. Cutworms in wheat were complained of in the Ottawa valley. One report, the first record of the occurrence of the Wheat Midge in the Prairie Provinces, comes from central Manitoba ; no specimens were forwarded, but the observer, Mr. N. Criddle, is careful and describes the attack accurately, as small light reddish maggots tapering towards the head and clustered around the grains inside the chaff. The Grain Aphis was unusually destructive in several localities in the North-west Territories.

The pea and bean crops in Ontario have been short and low in quality, due chiefly to hot weather. Peas have been much attacked by the Pea Weevil, and many farmers, as a consequence, are turning their attention to the Grass Pea or Chickling Vetch (*Lathyrus sativus*, L.), which gives good crops of 10 to 30 bushels of seed per acre, suitable for nearly all purposes for which peas are used and also perfectly free from the attacks of the Pea Weevil. In Nova Scotia the Black Bean Aphis, or 'Black Dolphin,' has attacked Broad Beans and Horse Beans, so severely in some places as to ruin the crop.

The Pea Moth (*Semasia nigricana*, Steph.) occurred in some places, but not to the same extent as is frequently the case. At Ottawa there were so few of the caterpillars in cultivated peas that some experiments in spraying the plants with arsenites were rendered useless because neither the treated rows nor those left unsprayed as checks, showed any infestation. A plot of the Beach Pea (*Lathyrus maritimus*, Bigelow), however, was badly infested by this insect or an allied species which worked in the same manner and destroyed nearly half the seeds.

The Destructive Pea Aphis (*Nectarophora destructor*, Jnsn.), which was a most destructive enemy throughout Canada east of the prairie region during 1899 and 1900, and also attacked the clover to a less degree, has almost entirely disappeared ; only a single report of its presence was received. This was from the Island of Orleans, in the province of Quebec. Inquiry from correspondents at several places where it was abundant and destructive in 1899 or 1900, revealed that it had disappeared as suddenly as it had come.

The Grain Aphis (*Siphonophora avenæ*, Fab.).—The plant-lice so often seen upon wheat, oats and rye are well known to farmers. They sometimes occur in vast numbers, but generally disappear suddenly just as the grain is beginning to change colour, as a rule, being destroyed by their many parasitic and predaceous enemies. It is very seldom, however, in Canada, except in restricted areas, that these insects do much harm to the crops attacked. The Grain Aphis multiplies with great rapidity and the insects may be found of varying colours—green, yellow, reddish, or blackish—and of all sizes, on the plants at the same time, on the stems and heads in June and on the leaves in the autumn. These plant-lice in shape are of much the same appearance, but there are frequently more species than one present. Unfortunately there are no practical artificial remedies against grain plant-lice which can be applied on a large scale to fields of grain.

During the past summer there have been rather more important injuries by this insect than usual in the West—three or four slight attacks in Manitoba and two bad ones in the Territories. It is important, however, to state that these outbreaks are, as a general thing, put a stop to by natural enemies. Amongst these some of the most

efficient are small active parasitic insects of the hymenopterous genus *Aphidius*, which fly about among the colonies of slow moving plant-lice and lay their eggs in them. These hatch and the grubs feed inside their victims and destroy them. Infested plant-lice become swollen and hard, and subsequently the parasites emerge through a round hole on the back, or, others of the genus *Praon* coming out beneath the body, spin their cushion-shaped cocoons by which the dead plant-lice remain attached to the plant. In addition to these, several kinds of lady-bird beetles destroy vast numbers, both as perfect beetles and when in the dark-coloured crocodile-like larval form. These lady-bird beetles are oval in shape, flat beneath, and on their red or yellowish rounded backs bear two or more black spots. These well known beneficial insects are so frequently misjudged in their friendly relations with farmers that it seems well to give the above brief description, and again to mention that they are almost invariably friends and should not be destroyed.

The tapering slug-like larvæ of the *Syrphus* or Hovering Flies, about half an inch in length, are also invariably present where there are plant-lice and destroy enormous numbers of them.

'Regina, Assa., August 22.—I send you by this post samples of grain and insects on wheat. On the farm of Mr. Bell, of Davin, green insects have appeared. When I heard of this I drove to his farm. He showed me how the insects had emeralded the canvas of his binder, but, when we went to the fields, the insects were gone. He showed me how they had done damage, and we got a few of the insects which I send.'—N. F. Davin.

'Hicksvale, Assa., August 23.—I am sending you a few heads of wheat inclosed in an envelope with a green insect on them. You can see by the berry how they have affected the grain. It is something terrible the mischief they have done in my wheat fields. They are also on some of my neighbours' wheat. Please let me know what the name of the insect is and if any remedy is known, should it attack my wheat another year.'—J. J. W. Bell.

'Hicksvale, Assa., September 4.—I am sending you a parcel of wheat heads in a large envelope. As you will see, some of the heads are perfect, while others are very poor, with some good berries on the heads. There is a very small insect ; if you will take the bunch of heads and strike them on a white paper a few times, you will find plenty of the insects. I secured some of these by spreading some paste on paper and sticking them on it, which I will inclose in this letter, also some bugs which seem to me to be hunting for and eating the insect. No. 1 is the small insect which you will find on wheat heads. No. 2 is the bug which appears to be eating No. 1. No. 3 is another insect which has infested my wheat fields, also my neighbours', and destroyed hundreds of acres. I may say that there is a lot of wheat which was attacked by No. 3 that is not worth cutting, and is not being cut. I have in patches about 30 acres, I think, which I am not going to cut. Please let me know as early as possible what these insects are and how they affect the wheat.'—J. J. W. Bell.

The insects sent by Mr. Bell were : No. 1, a *Phlœothrips* of an undescribed species, the characteristic marks of the presence of which were very apparent on the green chaff of the wheat heads sent. No. 2, the Thirteen-spotted Ladybird (*Hippodamia 13-punctata*, L.), a persistent and always abundant enemy of plant-lice in the West. No. 3, the Grain Aphis, which had evidently injured the grain to a serious extent.

'Hicksvale, Assa., October 15.—Yours of the 11th September to hand in due time. I examined the standing wheat and could not find any of the insects which you call a *Thrips*, but I should think, if they had been on it, that they would have left it, as it was dead ripe and no substance in it for them to feed on. You seem to doubt that the grain was injured by the insect you call the Grain Aphis. To let you know how thick they were, the first day I was cutting wheat, there was a strip of grain only a few rods wide in the piece infested by them, and before night my binder canvas was coloured

green, a good deep green, where the heads of wheat fell on them, and on the decks these insects were creeping around almost as thick as they could. I did not cut any more wheat for about four or five days, and then the majority of them were gone. Would burning the stubble be of any benefit ? Quite a few farmers in this section have had their wheat destroyed in the same way as mine, and some of them think it is frosted, but, instead of being blackened like frosted wheat, it is a very light colour like fall wheat.'—J. J. W. Bell.

'Pincher Creek, Alta.—Kindly inform me what kind of a creature is inclosed in box herewith. It is found in large masses on the binder after cutting a field of oats sowed on new breaking this spring.'—A. E. Cox.

Wheat-stem maggot (*Meromyza americana*, Fitch).—The fly of the Wheat-stem Maggot is a very common insect all across the prairies, and more or less of the conspicuous 'white heads' due to the attacks of the maggots may nearly always be seen in any field of wheat. In the enormous crops of the past season these attacks were seldom noticed by wheat growers, but a few farmers sent in specimens or injured stems with inquiries as to the cause. Some of them were from Pilot Mound, in Manitoba, and from Whitewood, Indian Head, Grenfell and Sumner, in the North-west Territories.

THE HESSIAN FLY

(*Cecidomyia destructor*, Say).

The ravages of the Hessian Fly in the fall wheat crop of Ontario, sown in 1900 and the spring wheat of 1901, have been more extensive than for many years. Barley has also suffered seriously in a few places reported from, as well as doubtless in many others from which no reports have been received. In a bulletin issued in August last by Prof. Wm. Lochhead, of the Ontario Agricultural College—one of the most complete, concise and useful bulletins upon an entomological subject which has ever appeared in Canada—the total loss caused by the Hessian Fly in the province of Ontario in 1901 will not, it is stated, fall below $2,500,000. This estimate, I believe, is placed too low, as recent reports show that the infestation of spring wheat was much wider spread than was known at the time the above statement was written. In the Ontario Crop Report for November, 1901, the fall wheat crop is stated to be 'a good deal below the average from various causes. In the western counties the ravages of the Hessian Fly were great and much of the surviving grain was light in weight on account of the extreme heat and drought of June and July. Reports from the eastern section—which is free from the Hessian Fly—are somewhat more favourable, especially as regards the Ottawa valley, and East Midland counties, where the crop was a fair one, the principal causes of injury being the excessive early rains and the drought before harvest, owing to which much of the grain is shrunken.' Although in the main the above statement as to the Ottawa valley is correct, all crops of the small amount of fall wheat which is grown in the Ottawa district, were not altogether free from the Hessian Fly, and spring wheat was very badly attacked in some places. Some varieties on the experimental plots at the Central Experimental Farm were injured to the amount of 40 per cent. No mention of Hessian Fly was made this year by correspondents in the Maritime Provinces, and very few reports of injury have been received from Manitoba where it was so very destructive in 1899.

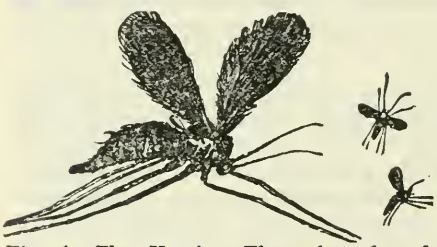


Fig. 1.—The Hessian Fly—enlarged and natural size.

Among a large number of correspondents who have favoured me with reports upon their observations on the Hessian Fly during the past season, I am under special obligation to Mr. John C. Wallis, of Manor Farm, Ferguson (Middlesex Co.), Ont., who has kept me well posted throughout the season on the condition of the infestation. The following is a résumé of his observations which are tolerably representative of the conditions in the south-western counties of Ontario where much fall wheat is grown.

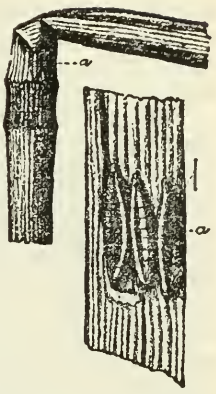


Fig. 2.—Hessian Fly; injured wheat-stem; three puparia—enlarged.

'December, 1900.—Wheat plants full of fly.

'January, 1901.—A mild month. Hessian Fly still to be found in plants above the ground.

'February.—A furious winter month. Heavy snow and plants well covered.

'March.—Similar to February.

'April.—Open and mild, with a very cold and dry parching east winds, which have completely killed all injured wheat plants.

'May 1.—Have had several wet days, but it is now dry. A conspicuous absence of fly, with thinned prospects for wheat.

'May 6.—Upon the snow going away, I made close examination and found some of the flax-seeds. I have just put the twin ploughs on some 9 acres and turned it under. There was an absence of winter-killed wheat, except of the injured plants. The fly has worked my fields and my neighbour's to the extent of cutting out four-fifths of the wheat, and, as the land is very strong, it would grow weeds, so we have sown barley. Of course, I am quite alive to the danger of the fly getting into that. Many farmers are drilling barley across the fields with the hope of getting a mixed crop, and, if the fly should take it, we can plough it down for manure.

'June 1.—Since the beginning of May the weather has been continuously cold and damp; the fly has made great headway.

'June 16.—Inclosed you will find a few specimens of the work of the Hessian Fly. As before stated, I found one stalk infested by no less than 55 flax-seeds. I have commonly been informed of 15 to 40. There are farmers now ploughing up their fields. There is but one outcome, namely, a suspension of wheat culture for a period, unless something unforeseen intervenes to rid us of the pest. I have made a minute examination of the growing barley, and at the time of writing have found no sign of the fly in it, nor in the rye. I notice that Prof. Lochhead recommends late sowing, but this, I believe, is no great safeguard. Late sowing renders the plants so much weaker that the fly seems to be all the more at home in their tender, juicy state.

'August 31.—I mentioned to you that I had sowed barley where I had ploughed down deeply my wheat, which was killed by Hessian Fly. This barley came along royally until it began to make the second and third leaves, when it turned yellow. Upon examination, I found it thoroughly infested. This was ploughed twice, and the land being mellow and rich, I am going to seed it down again with Red Poole wheat, so as to get it seeded out. On this piece I am going to depart from my early and late practice and shall sow from September 10 to 13. I know that the chances of getting a crop are against me, but I prefer to seed down with wheat, and, although I find that no remedy is always effective against the fly, good cultivation and proper rotation are essentials. Even these, however, are no guarantees of a crop. All the grain here this year is surprisingly light and disappointing. Oats are very light indeed; roots also have suffered and are the lightest for years. Corn is now doing tolerably well and, if frost keeps off for a time, we may get an average crop. Altogether I have not seen such an extreme season in all my experience.'—J. C. Wallis.

Mr. Wallis reported from time to time on the fields sown after the barley was ploughed down. He sowed at the date mentioned above (Sept. 10-13) with the soil

in good condition as to moisture and very carefully prepared. The seed was thoroughly cleaned and the wheat came up promptly. Writing on November 16, Mr. Wallis reported that there was hardly any Hessian Fly to be found in this field, while other fields in the same locality sown on August 30 and September 1, were badly affected.

It may be pointed out that September 10 for the county of Middlesex, where Mr. Wallis's land is situated, is the date given in Prof. Lochhead's bulletin as the average date when wheat may be sown there with safety. As has been frequently stated, the emergence of the adult Hessian Flies is dependent to a very large measure on the weather, considerable moisture seeming to be necessary before the flies will leave the puparia. This accounts for a somewhat wide range in the dates when the majority of the flies appear in any season. Prof. Webster, of Ohio, who is one of the highest authorities concerning the Hessian Fly, says :—'The dates after which sowing can be safely undertaken in the State of Ohio vary over a period of at least a month from the northern to the southern latitudes of the State, or approximately from September 10 in the north to October 10 in the south. Wheat sown after the dates mentioned or after intervening dates in intervening latitudes will germinate in normal seasons after the Hessian Fly has appeared, and be free from attack.'

If a farmer who intends sowing fall wheat will watch the weather during August, he may calculate pretty well for himself when it will be safe for him to sow. As Prof. Lochhead has pointed out, 'the farmer, if he wishes to grow wheat free from the fly, must follow the season rather than the almanac ; for the best date for one season may not be the best date for another. For instance, a rainless August, such as we had in 1899 and 1900, will retard the emergence of the fly for two weeks, but an August with a considerable rainfall during the last two weeks will bring forth the flies about September 1, to deposit their eggs ; in which case it will be quite safe to sow according to the dates given.'

From the above facts it is manifest that no definite dates can be fixed upon for every year, but at the same time average dates of safety may be mentioned as the proper time for sowing fall wheat, as far as injury from the Hessian Fly is concerned. Prof. Lochhead says :—'It seems not safe to sow, in ordinary seasons, before September 15, in the counties bordering on Lake Erie, and the tract of land occupying the valley of the Thames. In the next row of counties, including Lambton, North Middlesex, Oxford, Brant, Wentworth, and those bordering on Lake Ontario, the probable safe date would be September 10, while in the counties farther north, the safe date may be placed at September 5.'

The only objection to sowing late—at the end of September instead of at the end of August—is that the plants, it is claimed, have not time to make vigorous roots and tops so as to withstand the cold of severe winters. I have, however, frequently seen excellent crops which were sown late in September, and, as long as the Hessian Fly is abundant, I have no hesitation in recommending farmers sowing fall wheat to delay this operation until the end of September. There certainly is an advantage in sowing early, but this is not sufficient to offset the risk of losing the whole or a large percentage of the crop from the attacks of the fly. Prof. Zavitz, Experimentalist, of the Ontario Agricultural College, has kindly favoured me with the following data :—

'Guelph, May 3.—In the average of four years' experiments in sowing wheat at different dates, we find that by sowing from August 25 to 26 we get an average yield of 44 bushels per acre ; from sowing September 2 to 3, an average of 39·4, and from sowing September 17 to 20, an average of 37·3. There is, therefore, a difference of less than 7 bushels per acre between the yield of the first and last seedings.'

Parasites.—Parasites, but in small numbers, have been reared from almost every district from which we have received specimens of the Hessian Fly this season. In no cases, however, were these parasites in such numbers as to warrant the hope that the Hessian Fly would be very much lessened in numbers next season. Nevertheless, past experience has shown that parasites may sometimes be present in sufficient num-

bers to reduce materially some serious outbreaks of insects without being noticed even by careful observers.

Remedies.—The habits of the Hessian Fly and the best remedies are widely known by those concerned, and with co-operation a great deal can be done to reduce the injuries by this most destructive insect enemy of our staple crop. The best remedies are :—(1) Late sowing, preceded by trap crops sown in August and ploughed down by the middle of September ; (2) Thorough preparation of the land—Prof. Webster lays great stress on this ; (3) The burning over or ploughing down of stubble on fields which have been infested ; (4) The burning of screenings and refuse after threshing ; (5) The use in spring of quick-acting fertilizers upon a slightly injured crop.

CUTWORMS IN GRAIN.

Injury to growing grain by cutworms has been complained of more frequently than usual. By far the widest-spread and most disastrous outbreak was in central Manitoba toward the end of June. Reports of injury were received from Minnedosa, Baldur, Springfield, Kildonan, Niverville, Miami, Roland and Rosebank. The loss in oat fields in the Carman district was great. The Hon. R. P. Roblin, the Minister of Agriculture for Manitoba, who lives in this district, told me when examining these fields with me that he had never seen such an outbreak for twenty years. Many fields of oats which had been eaten bare, were sown again to oats or to barley. One very remarkable feature of this occurrence was that the cutworms, although showing a great preference for oats, would also eat wheat and to a much smaller extent barley, but if they began on any one of these crops, they seldom spread into another. A great many oat fields were seen which had been eaten almost, or quite bare, right up to the edge of a crop of wheat with nothing whatever intervening, and the wheat plants were apparently quite untouched. Occasionally, but very rarely, the opposite to this was observed. At the time of my visit, July 1, most of the cutworms had already attained full growth and it was difficult to find them. Such as were found proved to be the Red-backed Cutworm (*Carneades ochrogaster*, Gn.). This species seems to be very peculiar as to its food habits. It is one of the commonest and most destructive cutworms in the Ottawa valley where it attacks particularly spinach, cabbages, tomatoes, beet-root and onions. In grain fields and on unworked land it confines its attacks almost entirely to the Lamb's-quarters (*Chenopodium album*, L.), a wild spinach, and I have many times noticed grain fields, of both oats and wheat, in which every plant of Lamb's-quarters had been eaten down, but not a single stem of the grain was touched. I was therefore very much surprised to note its unusual habit in Manitoba of attacking growing oats and wheat. Where very abundant, however, it did not always confine itself to a single food plant, for in a garden which I visited at Morden, Man., all kinds of vegetables had been destroyed.

The injuries in grain fields in the Ottawa district in Ontario were by a different species of cutworm, namely, the Glassy Cutworm (*Hadena devastatrix*, Brace). These greenish white caterpillars with reddish heads, unlike many other cutworms, seldom come above the surface of the ground, even at night, but lie hid among the roots of various kinds of grasses, cutting off the shoots at the base. These were reported by Mr. Meredith Caldwell as having done much harm in wheat and oat fields at Luskville, near Eardley, Que. They were worst on clay and marl ridges, but were also very destructive on level clay lands. Prof. Lochhead also tells me that about Gravenhurst, Muskoka, many fields of oats 15 to 20 acres in extent were badly injured by the same cutworm between May 10 and 25. This species as a rule is only troublesome in grain fields sown on grass lands which have

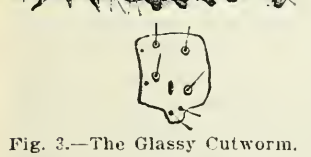


Fig. 3.—The Glassy Cutworm.

recently been ploughed up. As the caterpillars remain beneath the surface, it is almost impossible to reach them with any remedy. In my report for 1898, I refer to an attack by this same cutworm on a field of oats which had been almost destroyed in the last week in May. At that time the caterpillars were almost full grown and very effective work in the way of cleaning the land was done by turning on flocks of chickens and turkeys which devoured large numbers, but soon crows took so many of the young chickens that the poultry had to be shut up again. However, I am quite sure from what I know of the habits of crows that they kept on at the useful work of destroying the cutworms. By June 8 the caterpillars were full grown or they had been eaten by the chickens and crows, and the land was again sown and produced a heavy crop.

Fig. 4.—The moth of the Glassy Cutworm.

A knowledge of the habits of even such common insects as many of the various kinds of cutworms is frequently of much money value to farmers. When insects appear in large and destructive numbers most of them become full grown, and as in the case of cutworms cease feeding at about the same time. Therefore if enough is known of their habits to recognize when they are full grown and consequently will not eat any more, a field may be re-sown at once without any danger and with no unnecessary loss of valuable time.

Cutworms are very seldom noticed until they are nearly full grown and their depredations are so great that they attract attention by their inroads upon a crop. In most instances these attacks are not reported until it is too late for remedial measures. This was generally the case in Manitoba last spring, although the moths were noticed as particularly abundant in 1900 by collectors of insects. Mr. A. W. Hanham, of Winnipeg, writing on the insects of the season in December, 1900, says '*C. ochrogaster* (the parent moth of the Red-backed Cutworm) was by far our most abundant cutworm moth this year. I never went out during their season without seeing them in such numbers as to be a perfect nuisance when collecting.' Practically the same report was received from Mr. E. F. Heath, of Cartwright, Man., Mr. H. W. O. Boger, of Brandon, Man., and Mr. L. E. Marmont, of Rounthwaite, Man.

'Morden, Man., June 6.—In this country the cutworm is undoubtedly with us every spring time, but never before in the history of the country did it work so much damage as it did this season. Usually manifesting itself entirely in the gardens, it this year during the dry month of May invaded the grain fields and in several localities in this district has already done great damage to the growing crops. Many fields of grain were completely eaten off. The grubs seemed to have a preference for oats, but wheat also suffered. One farmer reports 70 acres of growing wheat completely destroyed, and another, 40 acres of oats as bare as though never planted. Reports of serious losses from this cause are general, and the infliction appears to be serious enough to call for investigation. Unlike the grasshopper, the cutworm is a regular institution of the country, and its operations this season show that it may develop destructive powers heretofore unexpected. Some of the farmers here are ploughing up and re-seeding the grain fields destroyed, although this seems to be a useless proceeding while the worms are still in the soil to eat it off again. It may be stated here that there is a general impression that any plant cut off by the worm will not grow again, but this is open to question. In most cases the plant is undoubtedly destroyed, but it is not so in all cases, and grain crops certainly ought to come again, the same as if cut down by severe frost. It is a new experience here for grain fields to be seriously damaged by the familiar cutworm and is no doubt to be accounted for by the unusually favourable conditions. The worm thrives in loose dry soil, but it cannot reproduce itself, because the cutworm is a true caterpillar and does not reach its full development till mid-summer when it completes the round of its existence by becoming a moth.'—J. F. Galbraith.

'Morden, Man., June 21.—Since the rains came, the operations of the worms are not so noticeable, but I found them recently as plentiful as ever in my garden, and a good many small ones also which appear to have been recently hatched.'—J. F. GALBRAITH.

I visited Mr. Galbraith's garden at Morden on July 1 and had an opportunity of seeing the great destruction which had been wrought by the cutworms among peas, cabbages, cucumbers and other vegetables. At that time there were none of the insects to be found, and Mr. Galbraith and others in the same place were of the opinion that they disappeared about June 20. Some Indian corn, which appeared above the the ground after that date, was growing vigorously and had not been touched.

Telegram.—'Miami, Man., June 10.—Brownish cutworms destroyed oat fields. Will it be safe to resow immediately with barley ? Worms still numerous. Wire.'—THOS. RENWICK.

Reply.—'Do not resow for ten days, am writing.'—J. FLETCHER.

After telegraphing the above reply, Mr. Renwick was written to for specimens, and advised to watch the development of the cutworms, and not to sow until some of them were seen to be changing to chrysalids. The poisoned bran remedy was also recommended.

'Miami, Man., June 15.—I send you cutworms now. I looked carefully, but could not find a single chrysalis. The worms are still numerous, but the weather is now damp and wet, and they appear to be cutting the grain off a little above the surface, instead of below it as in the dry hot weather, so I do not think they will now do so much damage. A good deal of seed grain has been lost by re-sowing too early. One farmer had 70 acres of wheat destroyed. He re-sowed at once with wheat and also lost it. On my own adjoining farms the worms do not touch the wheat, although numerous in the ground. Another farmer sowed a mixture of wheat and oats for feed ; the worms took nearly all the oats. On the same farm a five acre patch was completely cleared in the centre of an adjoining wheat field. It looks as if there were two varieties at work, one of which will not touch wheat. I have farmed here for twenty years and never before sustained any damage from cutworms. Do you think they will be likely to recur again ? I notice they also eat barley, which is only now coming up, since the rains came.'—THOS. RENWICK.

'Brandon, Man., June 21.—The Director wishes me to send you specimens of some cutworms which are doing a lot of damage here this year. I am mailing you under separate cover one feeding on flax and another on oats ; the loss from the one feeding on oats is quite serious. Southern Manitoba papers are full of accounts of the loss in oat fields, and Sir Wm. Van Horne's foreman at Selkirk writes me that he has lost nearly all his oat crop from their ravages, over 100 acres. We have only lost four plots of oats of one-twentieth of an acre, and two plots of flax. They are still working at the flax but have about stopped on the oats.'—S. A. BEDFORD.

'Winnipeg, December 10.—So far as I have been able to learn, the damage occasioned by the ravages of the cutworms in oat fields occurred mostly in the Balmoral district, north of Winnipeg, and throughc t Springfield, east of this city.'—GEO. BATHO.

Remedy.—The well known poisoned bran remedy was about the only one which could have been used effectively against such an outbreak as that recorded above. This could certainly have been used with much advantage in gardens. For field practice, probably the best course in such an exceptional visitation was that adopted by Mr. Renwick, viz., to watch for the date when the cutworms become full grown and then re-sow the land either with a crop for green feed or late roots. When grain has been sown on stubble in the West, turning the land down for summer-fallow would be advisable.

The Red-backed Cutworm is the caterpillar of a brown moth (*Carneades ochrogaster*) about an inch long when the wings are closed, which lays its eggs in the autumn upon weeds and other vegetation. The eggs hatch the following spring and the young caterpillars are seldom noticed while they are small. Land, which is allowed to bear a crop of weeds in the autumn, is therefore more likely to attract the moths to lay their eggs than land which is kept clean. The destruction then of all useless vegetation and particularly of weeds in the autumn is a good preventive remedy against cutworms of many kinds.

GRASSHOPPERS.

Locusts, or as they are more generally called Grasshoppers, have again this year been the cause of considerable loss in some places, particularly in Central Manitoba and in parts of the interior of British Columbia. Outbreaks more or less severe were also reported from western Ontario, New Ontario, and Nova Scotia, but these occurrences, although severe, were of short duration. Much more important were the ravages of grasshoppers in the West.

Fig. 5.—The Rocky Mountain Locust.

In Manitoba, spring opened later in 1901 than the previous year ; as a consequence, grasshoppers also appeared later, and, as the conditions for growth of all kinds of crops were most favourable, there was every hope that there would be no injuries by grasshoppers. The appearance of the crops was so unprecedentedly good and there was on the prairie such exuberant growth that it seemed to farmers impossible that these insects could affect the crop. However, in certain localities active measures were necessary. Some fields of large extent were stripped bare, and others were only saved by energetic and persistent work. On the whole, therefore, although loss from these insects did not appear to affect the enormous total grain yield of the province, 85 million bushels, it was a serious matter for some farmers in the localities visited.

The development of this outbreak is described in the following correspondence :—

'Winnipeg, April 15.—Last week we had very fine warm bright days, and I have received a report from the Stockton and Treesbank districts that young grasshoppers are hatching out in millions. Yesterday was cold, and last night we had frost ; to-day it is thawing a little. I am hoping that this severe weather will finish most of the grasshoppers, or at least be a check to them.'—Hugh McKellar.

'Winnipeg, May 29.—I regret to advise you that grasshoppers are again becoming a menace to the farmers in the districts where they were prevalent last year. Ten days ago I visited the districts north of Methven and east to Treesbank. Only very few could then be found, all in the first stage. It was impossible at that date to estimate what another week or two would bring about. I am now advised by Mr. Norman Criddle and Mr. Cullen, of Aweme, and Mr. Jerome Henry, of Stockton, that they are likely to be as bad as last year, although you will notice that the date is later than last year's trouble. Farmers are asking for Paris green and I have already sent out 50 pounds by express. This is to carry on the fight against them on the plan given by Mr. Norman Criddle, and referred to in your last annual report. I have also just been advised that locusts have appeared in great numbers on the Eastern Mennonite reserve, municipality of Hanover, at the village of Chortitz and other villages in the district. The Minister of Agriculture would be pleased to have you spend a few days here before going west to the Territories in connection with your summer's work. I should be pleased to have any suggestions you wish to offer in the way of fighting the hoppers.'—Hugh McKellar.

'Winnipeg, June 6.—I have just received your favour of the 3rd inst., and will now report further on the grasshoppers. The last two weeks of May were dry and the last week hot and dry. Everything was favourable for the grasshoppers, while wheat

was, practically speaking, at a standstill. The grasshoppers are later this year than last, being only in the second or third stage when I saw them on Friday last ; in fact, many of them were still in the first stage, and I suppose others were not yet hatched. You could readily notice, as you drove from farm to farm, where they were doing damage, a strip was eaten clean off from 3 to 10 feet wide, and sometimes a corner extended in, on a rise of ground, 20 feet or more. Farmers told me that, where fields were ploughed last spring or early this spring, no hoppers had appeared. The trouble is all from stubble fields not yet ploughed. I have great sympathy with the farmers ; they could not carry out the instructions to the letter as to ploughing all stubble. You will remember that, where we went together last year, and where the trouble is again this season, the farmers on that light soil summer-fallow nearly half of their land each year. Last year the harvest extended almost to snow fall on account of the wet weather, so that farmers could not possibly plough all their stubble land. This year spring conditions were so favourable that it was generally thought that we must be going to have a very big crop ; the farmers, accordingly, tried to put in as many acres as possible, feed for horses was scarce, and the result is that the stubble fields are still unploughed, and their horses are poor. The only remedy I can see for cleaning out the hoppers, if they continue to appear annually, is for farmers to curtail their farming operations, and seed down part of the present cultivated land to brome grass, so that they can handle the remaining portion before the grasshoppers hatch in the spring. The outlook, however, is now hopeful. Rain commenced to fall in the western part of the province on Saturday, coming to Brandon on Sunday, and on to Winnipeg by Monday night. Tuesday was wet, Wednesday cloudy and some misty rain, and to-day we had wonderful rain and a storm of rain and snow, which of course melts as it falls. I think these conditions are general over the province. I shall anxiously watch what effect the rain has on the hoppers, and, as soon as the weather fairs up, I shall again visit the districts. I hope it may not be for a week or ten days and that this weather will finish the grasshoppers for the season. The growth of wheat and all vegetation will be so rapid that the grasshoppers will be lost in it. I shall be pleased to report to you from time to time about them.'—Hugh McKellar.

'Winnipeg, June 17.—Although the grasshoppers are so troublesome this season, yet I do not think that any great majority of them are *M. spretus*. I have letters from Morden, Altona and Chortitz, as well as from all points where they were numerous last year, asking for investigation and instruction. I understand that they are very numerous at these points. My intention is, at present, to go with you on a flying trip through the whole district to all of these points, so that you may be thoroughly acquainted with the conditions that exist, and may be able to advise the Department regarding any further work which you may think advisable. No doubt some meetings will be held and addresses delivered to the farmers. Rains continue every other day, and from all parts of the province come reports of most wonderful growth of all kinds of vegetation. We have sent out over 1,000 pounds of Paris green, and I am receiving very favourable reports of the success of farmers in destroying the grasshoppers.'—Hugh McKellar.

Mr. McKellar's expectations as to the early disappearance of the grasshoppers were only partially fulfilled. The wonderful growth of all vegetation certainly prevented what would have been serious loss in an ordinary season.

'Brandon, Man., June 28.—On the light land near Sewell, grasshoppers have been very bad lately. I saw a field of over one hundred acres sown with wheat with not a solitary blade of grain or grass standing—only a few Artemisias. Grasshoppers by the millions were on the roads. I am sending you a few by mail.'—S. A. Bedford.

The grasshoppers sent with this communication were all the Lesser Migratory Locust.

At the request of the Provincial Minister of Agriculture, I was instructed by the Honourable Sydney Fisher to proceed to Manitoba to visit the infested districts and,

if possible, assist in the remedial measures which were being taken to prevent loss. I reached Winnipeg on June 30 and at once reported to the Honourable R. P. Roblin, and talked over the whole matter with him and his deputy, Mr. Hugh McKellar. Leaving Winnipeg on July 2, in company with Mr. McKellar and the Rev. W. A. Burman, I visited all the localities from which reports of locusts' injuries had been received. The following report made to Mr. Roblin at the conclusion of this investigation recounts all the chief features of the expedition :—

WINNIPEG, MAN., July 6, 1901.

The Hon. R. P. Roblin,
Minister of Agriculture and Immigration,
Winnipeg, Man.

DEAR SIR,—I have the honour to inform you that in accordance with your request I have made an inspection of those districts in Manitoba from which complaints have been received by your Department of injuries to crops by grasshoppers, so as to apprise myself of the actual state of affairs and the conditions prevailing, so that, if necessary, I might be in a position to advise you whether, in my opinion, any further steps could be taken by your Department to reduce injury and control this pest.

I left Winnipeg on the morning of Tuesday, July 2, in company with Mr. Hugh McKellar, the Chief Clerk of your Department, and Rev. W. A. Burman. We reached Rosenfeld Junction at 10 a.m., and started at once and drove to Altona (8 miles). Here we were joined by Mr. John Hebert, who kindly came with us to a farm belonging to Mr. Isaac Bergen (4 miles distant), and showed us a field of wheat in the edge of which a swarm of grasshoppers was doing some injury. These were chiefly the Lesser Migratory Locusts (*Melanoplus atlanis,* Riley), a native species, which on several occasions has been the cause of considerable injury. The insects were for the most part immature and unable to fly. A similar occurrence of the grasshoppers in the same state of development was seen at Rosenfeld when we left the train. There were in both of these places some mature grasshoppers with fully developed wings, by which the identification could be confirmed, and also in smaller numbers the Pellucid Locust (*Camnula pellucida,* Scudd.), and the Two-striped Locust (*Melanoplus bivittatus,* Say), but these two latter species were in smaller numbers than the first. At this point good work could be done, as was explained to the farmers, with hopper dozers or the Paris green mixture. These grasshoppers had come from a piece of land left for summer-fallowing where the eggs were laid last autumn.

We then drove 6 miles to Plum Coulee, finding grasshoppers rather numerous all the way, and near Plum Coulee noticed a few of the true Rocky Mountain Locust (*Melanoplus spretus,* Uhler) mixed with the Lesser Migratory species. This occurrence should warn the farmers to be on their guard and to make every effort to plough down, as advised by your Department, all land in crop this year, either this autumn or early next spring before the eggs hatch. It is well known that, although all of the injurious locusts lay their eggs upon bare spots in the prairie, the condition of the soil where a crop is grown is exactly what suits them best for egg-laying, and that the females will by preference resort to these fields to deposit their eggs. During the whole of this investigation we found it an almost invariable rule that where locusts were injuring a crop, they had originated in a near-by stubble field, or in untilled land once in crop but now neglected. Changing horses at Plum Coulee, we drove past Winkler to Morden (16 miles), where we passed the night. From Plum Coulee to Morden colonies of the Lesser Migratory Locust were seen at several places. At Morden, Mr. Galbraith showed us land which had been stripped by the Red-backed Cutworm (*Carneades ochrogaster*), a caterpillar of a species of moth which has been very destructive in many parts of the province during the month of June, particularly to the oat crop, in gardens and flax fields to a much less degree, to barley and in one or two rare instances to wheat. The preference, however, has been decidedly for oats. In the Carman district the preference shown for the oat crop was very remarkable, great injury having

been done, and where wheat fields came right up to the oats that crop appeared to be untouched while the oats were entirely devoured, even twice in some places where the fields had been re-sown too soon. The caterpillars seem to have attained their full growth about the third week in June, and up to that time any growth on the infested oat fields was destroyed. The remedies against cutworms are the keeping down of all weeds in the autumn upon which the eggs are laid or, when the caterpillars are found to be present in the spring, the distribution over the ground of the poisoned bran bait, which has been fully described in the last annual report of the Central Experimental Farm.

Leaving Morden early we drove 7 miles to Nelson, where the Lesser Migratory Locust was found in large numbers, mixed with the Pellucid and Packard's Locust (*Melanoplus Packardii,* Scudd.). We now drove to Rosebank (8 miles) swinging off to Mr. Pearce's farm where locusts were reported. These we found were almost all the Lesser Migratory and the Pellucid Locusts, many of them not mature. Near to Rosebank we found the Rocky Mountain Locust in small numbers. From Rosebank we took the Canadian Northern Railway to Fairfax, which is almost 14 miles south-east of Souris. From this point we drove a mile east to the farm of Mr. W. D. Moffat. Here we found the true Rocky Mountain Locust in enormous numbers, all mature, but still in a soft condition. Mr. Moffat was ploughing down all his stubble land, and intended poisoning with Paris green the following day. We next drove to Elgin where we passed the night, and proceeded to Hartney the following morning. Owing to the very heavy rain during the night, not many grasshoppers were moving, but the Lesser Migratory species and a few of the Rocky Mountain Locust were seen at several places and in too large numbers to be ignored or neglected. We took the train from Hartney on the morning of the 4th to Brandon and attended the annual champion ploughing match on the Experimental Farm in the afternoon. We heard of locusts in large numbers 4 miles north of the Experimental Farm, and a few specimens of the Rocky Mountain Locust were taken on the farm itself. At this point Mr. F. D. Blakely, of the *Nor-West Farmer,* joined our party. Leaving Brandon at 7.40 on the morning of the 5th, we went to Sewell, where great injury has been done this year, and where there was also much loss last year. Mr. Kellet drove us to his fields where the insects were in incredible numbers, almost all the Lesser Migratory species, but also small numbers of several other native species of less importance. Adjoining Mr. Kellet's land were several other crops of wheat which were being rapidly devoured, notably one large field of 200 acres, owned by Mr. Thomas Greenwood. These insects had undoubtedly migrated to the crops from unploughed summer-fallows. Nothing is yet being done, but much could still be accomplished by using the Paris green mixture. Everywhere through the crop, where bare ground showed, were patches of locusts from 50 to 200 or 300 together, and on the summer-fallows, with the exception of a few weeds, such as two of the Wormwoods (*Artemisia frigida* and *A. Canadensis*) and strangely one kind of grass (*Panicum dichotomum*), all vegetation was being rapidly devoured right down to the ground.

Driving towards Douglas, and 3 miles east of the farms mentioned, magnificent crops were seen, but the work of the grasshoppers was evident in many places. The farms of Mr. Moore and Mr. R. Russell were visited. At that of the latter an excellent illustration was found of the value of the Paris green mixture as a practical remedy against locusts. Adjoining a piece of unploughed summer-fallow was a piece of good wheat swarming with the Lesser Migratory Locust, most of the insects in a dying condition. For a space of 50 yards from the edge of this crop, where the remedy had been only once applied two weeks before, the ground was literally strewn with dead grasshoppers, and all along the edge of the head land, where they had gathered during the wet weather, the dead insects were lying in such numbers as to resemble a windrow ; on one spot 117 were counted in 18 inches square. At a corner of a field where, owing to their numbers two applications had been made, the dead locusts were even more numerous. At Douglas we heard of considerable injury having been done

and of the good effects of the Paris green mixture. We left Douglas at 2.30, and drove to Treesbank (25 miles).

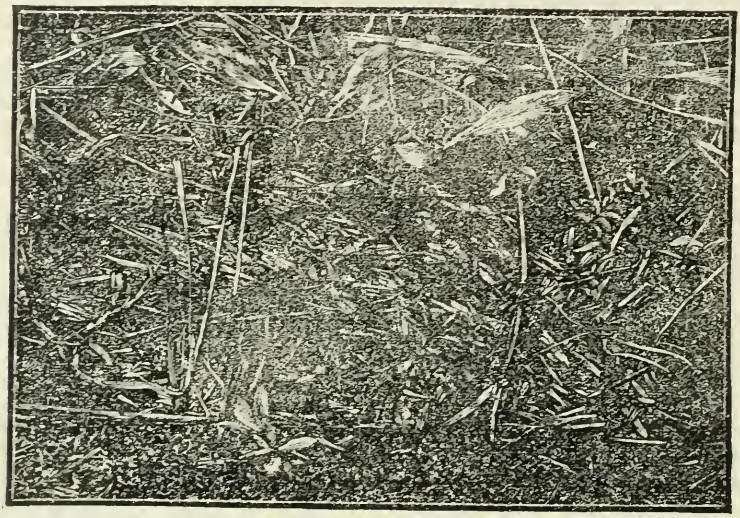


Fig. 16.—Dead Grasshoppers, kil'ed by Paris green mixture.
(From photograph by F. D. Blakeley, kindly lent by the *Nor'-West Farmer.*)

One and a half miles south of Douglas, on the farm of Mr. Agnew, much harm was being done, and also on the land of Mr. H. T. Sibbett, two miles further on. At this point a remarkable instance was observed of the attractive nature of horse manure to locusts. A manure pile outside a stable was so entirely covered with the insects that they could only be likened to the scales on a fish or the shingles on a roof. When disturbed they flew off like a swarm of bees. Here the first instance of the female locusts (*M. atlanis*) laying their eggs was observed. A few miles further on we came to the farm of Mr. T. Fortune, where we found a fine crop of wheat, which had been saved by the use of the Paris green mixture, on land where everything had been destroyed last year. We next inspected crops at Aweme, where magnificent fields were found, all of which had been similarly saved. Mr. Cullen used the remedy regularly, and has saved his crop. The same may be said of Mr. Criddle's crops at the same place. Too much cannot be said of the commendable and disinterested zeal which has been shown by Mr. Norman Criddle and his brothers in experimenting with this remedy, which has been developed and much improved from his experiments, and those of his neighbour, Mr. Vane. As a result he has saved good crops where he would, in all probability, have lost everything. Some of his neighbours are following his example with the same good results. The only assistance he has received is just such as you have given all other farmers who have applied to you, namely a supply of poison.

Leaving Treesbank at 6.30 on the morning of the 6th, we drove 5 miles west to some swarms, which had been previously located by Mr. McKellar, and found the Rocky Mountain Locusts on Mr. Jackson's farm at Banting, where they were injuring wheat around sloughs. Further west, at Mr. Geo. McCluskey's farm, large numbers of the Lesser Migratory Locust were doing much harm on a sandy field. Here a few dead locusts were noticed, which had been killed by parasites (*Tachina*) and the Black Blister Beetles were found, presumably looking for the eggs upon which the grubs of the beetle are parasitic. Returning to Treesbank, we drove to Stockton, calling at the farm of Mr. Jerome Henry, who has saved his crops by using the Paris green mixture. Taking the train at Stockton, we reached Winnipeg at 7 o'clock on the evening of the 6th.

In reply to your inquiry, and as a result of this investigation, I beg to say that I consider the remedy which you have been this year advising, an unqualified success. Through the work of your Department all the known methods of fighting outbreaks of locusts have been tried, and as a result of last year's work special attention has this year been given to the cheap, easy and effective remedy of poisoning with Paris green. The results so far obtained are most satisfactory. If persisted in for another month, excellent and heavy crops will be reaped from many fields, where, otherwise, nothing could have been expected. The efforts of your department in giving instruction and encouraging farmers in the work of exterminating this pest have been all that any Government could do, and I approve most heartily of what has been done. The only suggestion I could have made, would have been to use the hopper dozers, as they were on hand, in some localities earlier in the season, and that possibly a weaker mixture of Paris green than that now used might be experimented with, so as to reduce somewhat the cost of the materials. This, however, I believe, is already being experimented with. Your Chief Clerk, Mr. McKellar, is thoroughly well acquainted not only with the different species of locusts likely to develop into crop pests, but also with their habits, and he has also used or tried all the known methods of remedy or prevention. All of these points I have discussed with him in the field during the past three seasons, and I must congratulate you on the great energy he has shown in giving information and help whenever and wherever needed by farmers who were unfortunate enough to have their crops infested by grasshoppers.

In conclusion, I beg to thank you for this opportunity of visiting the infested localities and seeing the good work which has been done under your orders. I believe the conditions in the districts above mentioned are still sufficiently alarming to require continued effort being put forth of the same nature as you have already adopted, and I most earnestly advise every farmer in all localities where locusts are, or should appear in numbers this autumn, to make a point of ploughing down deeply all stubbles, either before winter or early next spring.

I have the honour, &c.,

JAMES FLETCHER.

Reference is made above to a somewhat unusual injury by the Rocky Mountain Locust, in which wheat had been eaten down for a considerable space around small sloughs in wheat fields. Mr. Hugh McKellar writes of this :—

'Winnipeg, October 7.—You will remember that we noticed with some surprise the wheat plants eaten off around sloughs which were full of water at the time we saw them. This was on Mr. Banting's farm, near Treesbank. Mr. Banting tells me as an explanation of this that, at the time he was ploughing before seeding, grasshoppers were very abundant in the field, many of them being buried and smothered, but some always escaping and being driven before the plough. These took refuge in the grass of the sloughs in which there was no water at that time. All the land about these sloughs was ploughed, so that the only green place where they could get food was among the grasses in the sloughs. When the grain came through the ground, the grasshoppers at once moved into it, and, rains coming on, the sloughs filled up with water and all of the grasshoppers were driven out. The result was what we noticed—a complete circle around the sloughs eaten bare.'

The following interesting report by Mr. Norman Criddle is inserted in full on account of its scientific and practical value.

'Aweme, Man., Oct. 25, 1901.—These notes, taken on the spot, will give an idea of the locust outbreak this summer and how it was controlled in this district :

April 28.—First locusts noticed.

May 15.—Locusts extremely plentiful on abandoned farms.

" 21.—Most of the locusts are out.

" 26.—Locusts begin attacking wheat. Nothing has been done to stop them. Several hundred insects to the yard seen.

May 27.—Locusts are sweeping off the stubble on to the wheat fields.
" 28.—I spread poison up half a mile of wheat for the first time this morning, which has completely checked them, while on the adjoining fields they have advanced twice the distance. A shortage of Paris green experienced ; none to be had in neighbouring towns.
" 29.—I spread more poison ; many locusts dead where it was spread yesterday. The insects have made no further advance, but where not checked, they are rapidly clearing the fields. Lots of Gray Blister-beetles noticed.
" 30.—Nearly everyone is scattering poison. It is having a marvellous effect in checking the advance. Millions are being killed, while others continually replace them from the stubble fields.
" 31.—Locusts have made great advance toward the wheat fields, and some have entered them. We received 50 pounds of Paris green from the Government through Mr. McKellar yesterday. A lot has been spread. Have tried poison mixed with horse dung instead of bran.
June 1.—The horse dung has proved a great success : it is no sooner spread than locusts can be seen leaving the wheat and swarming toward it. There are on an average 25 to the foot dead where it was spread yesterday. Many more are dying.
" 3.—Horse dung has taken the place of bran ; it is much better. Locusts are well under control in this part of the settlement. Some have hatched on the prairie lately, mostly Gomphocerus species.
" 7.—Last three days cold, snow and frost. Locusts very sluggish. Most of the Tachina flies appear to have been killed.
" 9.—Locusts begin to fly.
" 13.—About one-sixth can fly.
" 18.—A quarter can fly.
" 20.—Three-quarters can fly. Mr. Cullen and I found many killed by Tachina grubs on a stubble field. They can be found nowhere else.
" 24.—Locusts begin flying away.
July 2.—Lots flying.
" 3.—Many flying into the wheat and lots over it.
" 6.—Countless numbers flying into the wheat. A few are laying eggs. Great quantities of poisoned mixture are being scattered about.
" 7.—Lots more flying into the wheat and away. They are doing some damage by eating the heads of wheat.
" 11.—Poison has been spread on an average every other day since May 28.
" 13.—Locust mites are getting plentiful.
" 15.—Several locusts found with hair worms in them about 8 inches long.
" 22.—Found a great many infested with Tachina grubs. The locusts had already been killed by poison. One locust had 11 maggots in it.
" 25.—Locusts have ceased migrating. Several found dead on ground ; cause unknown.
" 26.—Two found at different points clinging to weeds. Killed, apparently, by the fungous disease *Empusa grylli*.
Aug. 10.—Most of the locusts are depositing eggs.
" 19.—Eggs very plentiful in patches. Many of the pods have been broken open and the eggs destroyed by predaceous ground beetles (*Amara*), which are very abundant.
" 20.—Locusts laying eggs for second time.
Sept. 2.—Locusts have practically all died or have been killed. A few females yet remain.

'The poison mixture as now used by us consists of 1 part of Paris green, 2 of salt, and 35 to 40 of horse dung (by measure). Mix thoroughly, adding enough water

to make soft, without being sloppy. Scatter well, in quantity according to the number of locusts. They will be attracted for at least 40 feet by the smell. The horse dung is preferable when fresh, but will do several weeks old, even after being washed considerably by rain. The above remedy has proved and must prove a great success wherever used correctly. A simple way to keep locusts on the edge of fields is to sow a strip of rye around them. This grows much more rapidly than wheat and takes a lot of eating down to kill it. By this means the locusts are held where they are easily got at. Ploughing a strip next the wheat was also found effective. In this section all used poison and only a few acres of crop were destroyed. I am convinced that, had we begun the fight earlier, hardly a bushel of grain would have been lost. It is no exaggeration to say that dead locusts could be gathered up in wagon loads and at times be smelt for half a mile. Mr. Cullen, or Mr. Fortune, and one of our family, with horse and rig, kept the locusts from about 600 acres during the entire season. The locusts consisted mostly of the Lesser Migratory Locust (*M. atlanis*). *M. Packardii* was numerous, and there was a small percentage of *M. spretus, M. bivittatus, Camnula pellucida* and *Gomphocerus* species. We are greatly indebted to the Honourable Minister of Agriculture and to Mr. McKellar, his Chief Clerk, for promptly forwarding Paris green when required, and for two visits of the last-named gentleman.

'In reply to your inquiry, we find the following treatment very useful in preventing locusts and crickets from eating binder twine, as they are very apt to do when the grain is standing in stooks. Soak the balls of twine in a solution of 2 pounds of bluestone to 12 gallons of water for half an hour, then dry thoroughly. Introduced by Mr. H. Vane, of this place.'—Norman Criddle.

Predaceous and parasitic insects seem to have increased at Aweme later in the season as the following extracts show :—

'September 15.—I send you two beetles of a species which has several times been found among locusts' eggs, the pods of which were broken open apparently by them. These beetles have been very abundant during the summer in company with several others somewhat similar.'—N. Criddle.

The beetles referred to above were Carabidae of the genus *Amara,* perhaps *A. carinata,* Lec. or *A. laticollis,* Lec., or a nearly related species. Unfortunately the knowledge of this genus is very imperfect. No specialist will undertake to name forms in this portion of the genus with certainty.

'November 15.—I deeply regret that I was unable to get you the locust eggs. All the best ground was ploughed before I had time to hunt. I am forwarding a few partly broken pods. The coating around the eggs is extremely thin this year, much more so than usual ; it is therefore almost impossible to avoid breaking them. The majority of pods in most places are already broken open and the eggs partly destroyed, principally by a small white larva. I am sending a small box containing some of these, some broken pods attacked and a few other insects found in the vicinity of the eggs, which may have helped to destroy them and which may prove of interest.'—N. Criddle.

The white larvæ were those of one of the small blister-beetles, well known parasites on the eggs of locusts. A few of them had changed on arrival at Ottawa to the very interesting pseudo-pupae, a curious extra stage of development which occurs in this family of beetles.* There was also the cocoon of a hymenopterous parasite. Upon inquiring from Mr. Criddle if he had noticed any unusual abundance of blister-beetles, he replied that they were decidedly more numerous last summer than usual, especially a small gray kind, of which several hundred would be seen within a few yards, and then perhaps no more for half a mile. No damage to crops by these beetles was noticed.

Mr. F. D. Cullen, of Aweme, reported that one hundred acres of his crop were destroyed by grasshoppers before he received the Paris green, and that they were attack-

* These proved to be *Epicauta Pennsylvanica,* DeGeer.

ing another hundred acres from every side, but that a few doses of Paris green stopped them promptly and the dead grasshoppers could be gathered up with a shovel. This hundred acres yielded 1,700 bushels of wheat.

Mr. Criddle's investigations and experiments are of great interest, and his discovery that horse droppings may with advantage be substituted for bran is of great practical value. This material is always available on a farm, while bran, which was formerly used as the best vehicle for distributing the poison, costs money and is neither so suitable for holding the poison nor so attractive to the locusts. Mr. Criddle was led to experiment with horse droppings from noticing that locusts flocked to this material whenever it was found lying on roadways. The mixture of horse droppings, salt and Paris green is undoubtedly the most attractive, fatal, and cheap remedy for locusts which I have ever seen used. It is easily distributed with a trowel, or wooden paddle, from a barrel placed in a wagon and driven round the edge of the field. It can be readily scattered for a distance of 20 or 30 feet out into the crop, by a person standing in the wagon. It is only when the locusts are in excessive numbers that this poison mixture would require to be distributed as frequently as was done by Mr. Criddle last summer. On Mr. Russell's farm, poison scattered a fortnight before my visit, although there had been several showers of rain since it was put out, was still being eaten by grasshoppers with avidity, and the insects were found dying all through the crop. As Paris green is insoluble, the mixture remains in an effective state as long as the adhesive properties of the horse droppings last. This remedy should be tried at once wherever locusts occur in destructive numbers. It will be noticed from my report printed above and from Mr. McKellar's and Mr. Criddle's letters, that in almost every instance where locusts were in large numbers, they had originated in land which had been under crop the previous year and which had been left for summer-fallowing during the present season. This accentuates the importance of early summer-fallowing. The ploughing down of all stubbles in localities where locusts have been abundant, should be attended to immediately seeding operations are finished. If this is impossible, it should at any rate be done before the insects reach the winged condition.

The species of locusts responsible for most of the injury in Manitoba were the Lesser Migratory Locust, the Rocky Mountain Locust, the Two-striped Locust, Packard's Locust and the Pellucid Locust. After leaving Manitoba and proceeding westward last summer, it was observed that locusts of all kinds were unusually scarce until British Columbia was reached. In this province much harm was done by these insects at certain places down the Okanagan and Nicola valleys. At the Coldstream ranch, at Vernon, B.C., fodder plants and orchard trees were injured to a considerable extent, and in driving down the Nicola valley from Kamloops to Nicola Lake, the grass on the ranges was found to be much reduced in quantity. Shrubs and Aspen Poplar trees in gullies were also much defoliated. Crops of oats and other grains, as well as turnips and garden plants, were in some places stripped bare. This injury in the Nicola valley was chiefly by the Pellucid Locust, and *M. affinis*, Brun., a species very closely resembling the Rocky Mountain Locust in colour, but closer, I am informed by Mr. E. M. Walker, of Toronto, to *M. atlanis*. It is bright-coloured like the Rocky Mountain Locust, but smaller in size. *M. affinis* was also taken at Kelowna on Lake Okanagan. The locust which was attacking fruit trees at Vernon, was the Lesser Migratory Locust (*M. atlanis*).

ROOT CROPS AND VEGETABLES.

The turnip crop in Canada during the past year, as a general thing, has been good, somewhat affected, however, in some places by the dry weather after midsummer. There was little complaint of the Turnip Flea-beetle, probably on account of the favourable spring.

The Turnip Aphis (*Aphis brassicæ*, L.).—The most serious injury was by the Turnip Aphis in New Brunswick and Nova Scotia, concerning which many letters were received. This attack on the turnip crop seemed to be a new experience to most of the correspondents in the Maritime Provinces. Spraying with coal oil emulsion or with whale-oil soap (1 lb. to 6 gallons of water) at the time the colonies first appear in July and August was recommended, also ploughing the tops down deeply as soon as possible after they are cut from the roots in autumn so as to destroy the eggs.

Cabbage Worms (*Pieris rapæ*, L.).—The green caterpillar of the imported Small White Cabbage Butterfly has been abundant and troublesome this year in many parts of the Dominion. In British Columbia it has spread rapidly over the whole province. The first record of its occurrence there was in 1899 at Kaslo, on Kootenay Lake. Last summer it reached Vancouver Island and appeared in numbers, which were very much greater this year. It was also extremely common in all the older provinces, being frequently referred to as 'the worst enemy of the cabbage.' Mr. C. H. Young, of Ottawa, observed the butterflies in such numbers in the month of June flying over cabbage and turnip fields, that he likened them to a heavy fall of snow. The best remedy, in my experience, for this insect on cabbage, and one which on the Central Experimental Farm has always proved effective, is Pyrethrum Insect Powder, 1 lb., cheap flour, 4 lbs., the whole to be kept for 24 hours in a tightly closed receptacle, the powder to be then dusted over the infested crop by means of special bellows or from a cheese-cloth bag. When, as is frequently the case, these insects attack turnip fields, spraying with Paris green or some other active poison is permissible. This may be done with perfect safety up to September. Two sprayings during the summer are the utmost that will be required, even in a bad season. On smooth-leaved turnips it will be necessary to dissolve a pound of soap in each 25 gallons of water before mixing with the Paris green, or the poison mixture will not adhere to the foliage. On cabbages, Paris green and other poisons must never be used. The insect powder answers all purposes without any danger, which is not the case with Paris green, because the caterpillars eat channels into the heart of the cabbages into which the poison is washed.

The Variegated Cutworm (*Peridroma saucia*, Hbn.).—Notwithstanding the plague of this insect on the Pacific coast last year, there was practically no recurrence of the trouble in 1901. In two instances only was damage to garden crops reported. These were both by Rev. G. W. Taylor, near Nanaimo, on Vancouver Island. Mr. Dashwood-Jones of New Westminster, who made observations on this insect for me last year, reports that moths were seen in some numbers in June, but that no harm was done to growing crops. Mr. J. W. Cockle, of Kaslo, an enthusiastic and careful student of insects, kindly sent me a cluster of the eggs laid at Kaslo, in the middle of June, from which a large brood of caterpillars was reared to maturity, all the moths emerging before winter, about the end of August. Mr. Jones gave the following dates from his notes which add somewhat to the life history of the species :—'The first specimen I saw of the moth of *P. saucia* was on May 20. The eggs hatched on May 30. The last date I saw any moths of the spring brood was on June 13. At the same time I found cater-

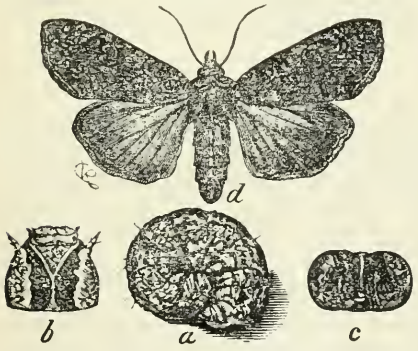


Fig. 7.—Variegated Cutworm ; *a*, caterpillar ; *d*, moth ; *b*, *c*, head and segment of caterpillar.

pillars. By June 23 they were rather troublesome under glass, but of course were soon checked. During the first week of July, I heard of the caterpillars in small numbers in several places, but they soon yielded to the poisoned bran treatment. On July 11, I found caterpillars of all sizes in potato patches, and also the first chrysalids, three in number. On July 22, the greater part of the caterpillars were changing to chrysalids, only small ones to be found. On July 31, the first moth emerged.'

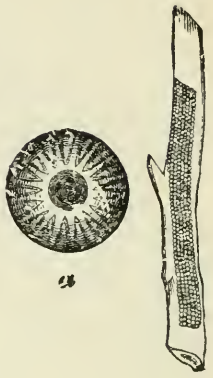


Fig. 8.—Variegated Cutworm ; eggs ; *a*, an egg enlarged.

In visiting, last summer, many places in British Columbia which had been devastated by the Variegated Cutworm during 1900, I made particular inquiries concerning this insect, but except in the localities mentioned above, it had not been observed at all. I was shown, by Mr. Tom Wilson, a collection of moths reared from cutworms which had done great injury in his garden at Vancouver in 1900 and was surprised to find in almost equal numbers with the moths of the Variegated Cutworm, specimens of the beautiful moth *Eupsephopœctes procinctus*, Grt., the caterpillars of which Mr. Wilson assured me were, in his garden at any rate, in equal numbers with those of *P. saucia*. He had noticed that the larvæ had differed a good deal, but had saved no specimens. I have pointed out frequently to my correspondents that I shall always be very much obliged for living specimens sent by mail of any injurious insects, however abundant or common they may be. I should in this instance have been particularly glad to see some of the cutworms of the moth *E. procinctus*.

Cutworms.—Cutworms of various kinds in different parts of the Dominion have as usual been the cause of more or less injury in gardens. One of the widest-spread and most destructive species of which specimens have been sent in from localities ranging all the way from Manitoba to Nova Scotia was the Red-backed Cutworm (*Carneades ochrogaster*, Gn.). The poisoned bran remedy has almost invariably given satisfaction to those who have tried it. Unfortunately, some applicants for advice have been so unpractical as to condemn this most useful remedy without trying it. By experiment, I have proved that not only is it of great value in gardens, but it may be used advantageously even in field practice. When cutworms are sufficiently abundant to cause wholesale destruction, they, as a rule, assume the habit of army worms, moving in large numbers from place to place as food becomes scarce, and it is frequently possible to head them off from further progress by scattering poisoned bait in front of the army.

Root Maggots (*Anthomyia*).—As is the case every year in some localities, cabbages, cauliflowers, radishes and onions have suffered much from these troublesome insects. They were decidedly more abundant than usual in some places in western Assiniboia and around Calgary, in Alberta, and also on the coast of British Columbia. Mr. Dashwood-Jones reports the Cabbage Maggot as abundant in the roots of cabbages of all kinds by May 15. At Ottawa, radishes and onions were being killed by the middle of June, and cauliflowers and cabbages by the end of the same month. Disks of tarred paper, slit from the margin to the centre and placed around the stems of cabbages at the surface of the ground at the time of planting, gave excellent results ; and plants treated by sprinkling a little sand impregnated with carbolic acid mixtures were protected in a large measure. Dusting hellebore along rows of radishes from the time they appeared above ground, once a week, also rendered them to a large measure free from the maggots. Kainit and nitrate of soda had little effect on radishes, but were very useful on all kinds of cabbages by inducing quickly a strong and vigorous root growth. The small staphylinid beetle *Aleochara nitida*, Grav., which is certainly a true parasite on these maggots, occurred in large numbers on some sandy lands at

Ottawa, and by the end of the season hardly any maggots or pupæ could be found in a place where they are usually very numerous. Another parasite also occurred with the above, but in smaller numbers, namely, *Eucoila anthomyiæ*, Ashm., a small black four-winged proctotrypid fly.

The Asparagus Beetle (*Crioceris asparagi*, L.)—This beetle and The 12-spotted Asparagus beetle, which have been mentioned in my last two reports as occurring commonly in the Niagara peninsula, have this year spread farther through the country. Prof. Lochhead found both species at Guelph, Ont., and noted that the 12-spotted species was the more abundant of the two. They were not noticed until the middle of August and they did no appreciable damage to crops. The Asparagus Rust (*Puccinia asparagi*, DC.) was reported from three or four places and was particularly injurious on some two-year old plants grown from seed at Ottawa. Mr. J. A. Balkwill reports that there was hardly any at London, Ont., in 1900, but that it increased to a marked degree last summer.

The Zebra Caterpillar (*Mamestra picta*, Harris).—The autumn brood of this caterpillar was remarkably abundant at Ottawa during September and October last, and caused considerable damage in gardens to many kinds of plants. The caterpillars were also destructive in fields of fodder rape and turnips. Clover and lucerne were also attacked, but the growth of these crops was so heavy that the loss was seldom noticed. In gardens, cabbages suffered a great deal, and, although they did probably little harm at the time of year they occurred, the caterpillars were extremely numerous on beets and asparagus. In the flower garden the greatest loss was in late flowering Gladioli. The eggs are laid in clusters of about 150. At first the caterpillars are gregarious in habit, and many spikes of flower buds would be destroyed by a brood of caterpillars before their presence was detected. When half-grown, these caterpillars separate and wander in all directions, attacking almost all kinds of vegetation. The full grown caterpillars are very conspicuous and very gaily coloured. They are two inches long, velvety black on the back, with two golden yellow stripes connected by narrow white wavy lines along the sides. The head and legs are bright reddish brown. When full grown these caterpillars spin slight cocoons just beneath the surface of the ground, and the moths fly in the spring and in August. They are rather dull-coloured, purplish-brown moths with white underwings and expand about 1½ inches across the opened wings.

The Squash Bug (*Anasa tristis*, DeG.), known locally as 'Bishop Bug' in western Ontario.—This troublesome and destructive insect was the cause of frequent complaints in western Ontario, from growers of all kinds of plants belonging to the Gourd family, such as squashes, melons and cucumbers. Mr. J. B. Spurr, of Toronto, a large grower of melons, who suffered considerably, reports, August 23: 'Squashes are very scarce on the Toronto market on account of the prevalence of the Squash Bug this year.' He made the interesting observation that on his grounds, when plants were attacked by the Squash Bug, they were not injured by the Striped Cucumber Beetle, and also that, when plants were attacked by the latter, they escaped the injury from the Squash Bug. This bug is very rare indeed at Ottawa. Twenty years ago, two specimens were taken here by Mr. W. H. Harrington, and none were seen since, although looked for carefully, until the past season, when a few specimens were taken. At Montreal Mr. M. Waring Davis reports considerable injury from the insect this year. Prof. Lochhead writes: 'These bugs were decidedly injurious in most localities throughout western Ontario. All the old well-known remedies seem to have failed altogether in keeping them in check. In the College garden it was decided to keep a watchful eye over the early Squash Bugs; but, in spite of great care exercised in hand-picking and spraying, they seemed to increase.'

Remedies.—There is still need of a better remedy than those usually advised to prevent loss from the Squash Bug. In seasons of ordinary occurrence, hand-picking

and trapping can be used to good effect ; but, when the insects are in very large numbers, as was the case in some places last summer, all remedies seemed insufficient. The usual remedies are :

(1.) Hand-picking, early in the season, of the old bugs, when they first resort to the plants, and also of the easily seen egg clusters. This requires an inspection of the vines every day or two. The young bugs may be easily destroyed with a spray of kerosene emulsion, or of whale-oil soap. This work is made much easier if a few hills of the ordinary squash are planted among melons, cucumbers, &c., so that they appear above the ground about a week before the crop. The squashes being more attractive, the bugs collect upon them, where they may be destroyed easily.

(2.) Trapping.—This consists of placing, at intervals through the plantation, shingles or pieces of board, beneath which the bugs gather for shelter. By examining these every morning, many may be captured. In a season when the bugs have been abundant, all vines should be burnt as soon as the crop has been gathered. In this way, many of the insects in all stages of development will be destroyed.

The Striped Cucumber Beetle (*Diabrotica vittata*, Fab.).—The injuries to cucumbers and melons by the Striped Cucumber Beetle during the past season were exceptionally severe and extended over the greater part of old Canada. Mr. S. C. Parker, of Berwick, N.S., speaks of it as particularly troublesome in Nova Scotia. At Berwick very few squash or pumpkins survived. In his own case, he planted squashes and cucumbers three times, the first two plantings being eaten up entirely. Frequent mention of injury by this beetle is also made in the Nova Scotia Crop Report for November. The most apparent injury is that done by the hibernating brood of beetles which attack young plants early in the season, and a little later the flowers, as soon as they open. The larva is subterranean in habit. It is a slender, wormlike creature, white, with a dark head, which attacks the roots and bores inside the stems.

As with the Squash Bug, a perfectly satisfactory remedy has not been so far discovered. The treatment of the larvæ in the ground has proved impracticable, except on a small scale. The greatest success has been obtained by covering the young plants with a square of cheese cloth, kept raised by two flexible sticks crossed at right angles and with the ends stuck in the ground. The cheese cloth is held down easily by putting some earth on the edges. By the time the plants have grown so as to require the removal of the covering, many of the first brood of the beetle will have disappeared. As an insecticide, Paris green with land plaster (1 pound to 50) dusted over the plants has proved more effective than several others which have been recommended ; but when the insects are in very large numbers, the plants are gradually eaten up, although large numbers of the beetles are destroyed. Other remedies which have given satisfaction in years when there was not excessive abundance of the beetles, are land plaster or ashes impregnated with coal oil or turpentine, scattered in small quantities on each hill. Tobacco dust from cigar factories, when obtainable, acts as a repellant to the beetles and also as a fertilizer. Pyrethrum powder is deadly to the beetles, but requires frequent renewal.

POTATO PESTS.

The potato crop has been very uneven ; and good crops were exceptional. Small crops were, I think, chiefly due to climatic conditions. In some parts of British Columbia, as down the Okanagan valley, many plants in a field would turn yellow and wither without any apparent cause, which would account for the death of the plants. The tubers in most cases were small but free from disease, and the leaves and stems showed none of the well-known fungous diseases. The hot, dry weather of

midsummer in eastern Canada was credited with a considerable shortage in the crop, but in some parts of western Ontario it is particularly noted that the potatoes put in late have yielded well.

The Colorado Potato Beetle has been very destructive in many places and was particularly abundant in Nova Scotia and Prince Edward Island, where the potatoes were not sprayed with Paris green or other poison. In Manitoba and the North-west Territories at a few points some injury was done by the Black Blister-beetle (*Epicauta Pennsylvanica,* DeG.). As is usually the case, however, the visitations were of short duration. I was informed by the Hon. R. P. Roblin of one instance in which a considerable swarm of these beetles on a neighbour's farm was cleared from a potato patch by a flock of 25 or 30 chickens. No ill effects to the chickens were noticed, which seems somewhat surprising. The Black Blister-beetles were abundant on potato patches in the city of Winnipeg and were attracting much notice during the first week of July, but had all disappeared before the middle of the month.

The Striped Blister-beetle (*Epicauta vittata,* Fab.).—Another beetle which this year has shown up far more abundantly than is usually the case is the Striped Blister-beetle, of which specimens have been sent in from a few places in western Ontario, as injurious to potatoes, tomatoes, mangels and beets.

Fig. 9.—The Striped Blister-beetle.

'Queenston, Ont., July 20.—I send you some striped beetles from a neighbouring farm. They are destroying tomatoes, potatoes, &c. These insects are very wary, and are gregarious in habit.'—W. O. Burgess.

'Cedar Springs, Ont., July 21.—I send specimens of a kind of beetle which is destroying my mangels. They come in swarms and eat the leaves. There are beets in the same patch, but they have not touched them yet. Do you think they will?'—Wm. Clayton, Sr.

'Stromness, Ont., Aug. 10.—Please find inclosed beetles that are eating up beets, potatoes and tomatoes. They are in gardens in swarms, and you can drive them like sheep. They are voracious eaters, and have nearly destroyed our beets. We sprayed them with Paris green, and it appears to have killed them. What are they? I never noticed them until this summer. Please give me some information on the subject.'—Henry E. Dickout.

The Striped Blister-beetle is a narrow, soft-bodied beetle about half an inch in length, with blackish wing-cases, each of which is margined with yellow and has a yellow stripe down the centre. The head and thorax are also dark, with yellow markings. The legs are long and slender, and the beetles are, as mentioned above, extremely active, flying readily from their food plant when approached. This habit is of much use in preventing these Striped Blister-beetles from destroying crops.

Like all the rest of its family, this species, in the larval form, is a predaceous parasite on the eggs of grasshoppers. It is, therefore, undesirable to destroy the beetles if this can be avoided. As is the case with nearly all leaf-eating insects, this one can be destroyed by spraying the crops with a poisonous mixture, such as Paris green and other arsenites. Prof. Webster found that Bordeaux mixture sprayed over plants kept these beetles away, and that they could be readily killed if whale-oil soap were sprayed on them. Owing, however, to the readiness with which they take flight when approached, an operation known by the name of 'driving' has been adopted in those parts of the United States where this species occurs, and where it is far more abundant than has ever been the case in Canada. In my experience, this insect has been very seldom mentioned as a crop pest in the Dominion, and it is worthy of remark that considerable injury was done by grasshoppers to crops in that part of Ontario, from which the above reports were received. 'Driving' consists simply of several people walking across an infested field with branches, or other conspicuous objects in their hands, waving them from side to side and driving these easily disturbed beetles ahead of them until they come to the edge of the crop, where they will disperse and seldom return. A character which is often noticed with these beetles is that they appear in large numbers suddenly, which is due to the fact that the larvæ

do not feed on vegetation, and the beetles, when mature, fly to the fields in swarms to feed. The crops which are most generally attacked are mangels and beets, but tomatoes and potatoes are also attacked. A satisfactory feature, too, is that a swarm seldom remains for any considerable length of time in any one field.

The Cucumber Flea-beetle (*Epitrix cucumeris,* Harr.).—This minute beetle, which does not exceed one-twentieth of an inch in length, is black, covered with short fuscous hairs, and is much more frequently complained of as a potato pest than as an enemy to any other crop. It is sometimes, in hot dry summers, one of the worst enemies of the potato, eating many small holes through the leaves and reducing them so much that they are unable to perform their functions. Reports of injury have been received from Vancouver Island and several places in Ontario. The best remedy for this insect appears to be spraying the vines with Bordeaux mixture. This treatment has given far better results than spraying with Paris green. The practice, too, of spraying potatoes with Bordeaux mixture is also an excellent one, as being an effective preventive of the Early Blight of the Potato, as well as of the much more destructive Potato Rot or Late Blight.

The Five-spotted Hawk-moth (*Protoparce celeus,* Hbn.).—The large caterpillar of this moth, known as the Tomato Sphinx, is frequently found in some numbers upon tomato vines, but its work is so conspicuous and the tomato makes such rapid growth that its injuries are very seldom important in Canada. However, the caterpillar feeds on many other plants belonging to the Nightshade Family, such as the potato and tobacco. It is frequently the cause of considerable loss in the large tobacco fields in the county of Essex, where it is generally spoken of as the Tobacco Worm. This name, however, belongs properly to an allied species, *Protoparce carolina,* Linn., which occurs very rarely in Canada. Prof. Lochhead, of Guelph, writes : 'The Tomato Sphinx was very abundant in 1901 on tomatoes, potatoes and tobacco. In fact, it was no trouble to gather hundreds of specimens of the large worm in a few hours.' During the past summer some reports were received from western Ontario of injury to potatoes by the caterpillars of the Five Spotted Hawk-moth. The potato, however, must be considered an exceptional food plant and the insect is not likely to become a regular pest of that crop.

THE POTATO-STALK WEEVIL (*Trichobaris trinotata,* Say).

During the past summer, another insect has been added to our Canadian list of crop pests. Prof. Lochhead writes to me as follows :—

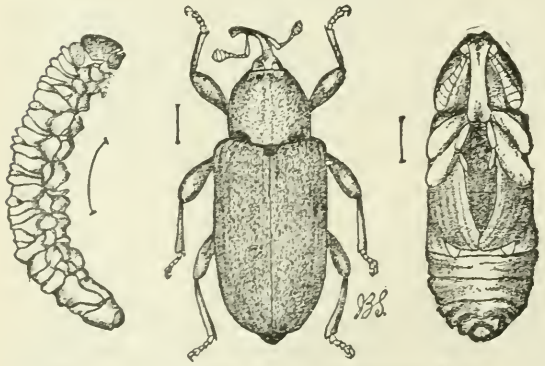


Fig. 10.—The Potato-stalk Weevil : larva, pupa and beetle—enlarged. (Kindly lent by Dr. J. B. Smith.)

'In September I received from Mr. J. A. Auld, M.P.P. for South Essex, specimens of potato vines which were completely destroyed by the Potato-stalk Weevil, and he reported that this insect was very prevalent in Pelee Island. Last year, he said, the island exported 30,000 bushels of potatoes, but this year it will have no more than enough for itself, and none to spare. It is almost impossible to tell the presence of the insect in the vines until they commence to wither and die. The vines sent me were badly tunnelled, and in some of them were found grub, pupa and adult.'

The Potato-stalk Weevil is a small, slaty-gray, oval beetle about ¼ inch long, with a black head and beak. There are also three distinct black spots across the shoulders.

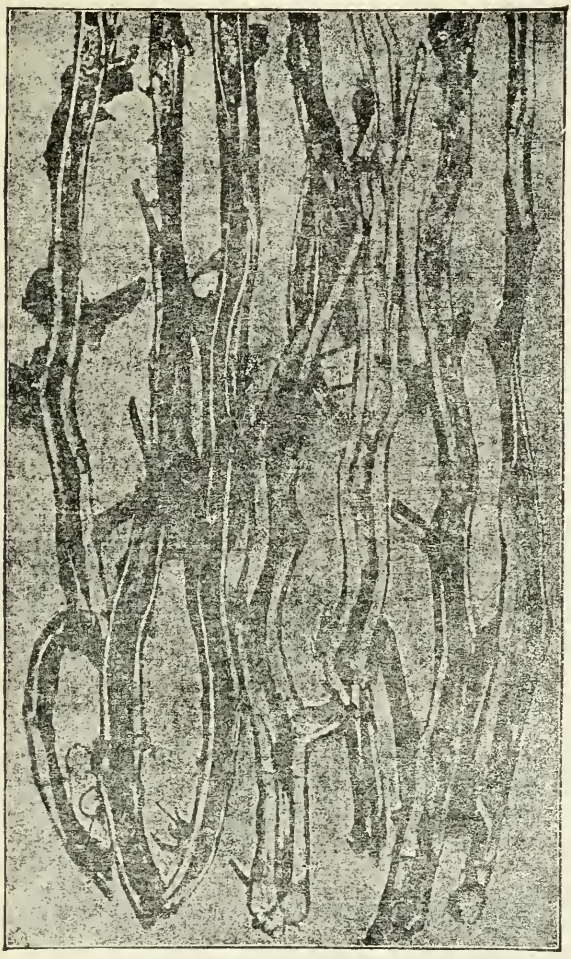


Fig. 11.—Potato vines eaten out by the Potato-stalk Weevil—somewhat reduced. (Kindly lent by Dr. J. B. Smith.)

The injury is done by the grubs, of which from one to five may be found during July and August in the stems of infested potatoes, the centre of which they have eaten out. The oval white eggs are laid by the females in slits which they make with their beaks in the base of the stem. The eggs soon hatch, and by about the middle of August the soft, yellowish white, legless and wrinkled grubs with brown, horny heads are full grown. These, like most weevil larvæ, lie in the stem in a curved position. Where there are several of these grubs, most of the central part of the stem is eaten, the leaves turn yellow and the stem dies prematurely; but, when only a single larva occurs, little harm is done. When full grown, the grubs usually work their way down to the base of the stalk and form white cocoons of fibres gnawed from the stem. The pupa state is of short duration. The beetles mature in August and September, but they pass the winter in the cocoons, and do not emerge until the following spring.

The Potato-stalk Weevil has never before been recorded from Canada as a serious enemy, but in several of the United States it has occurred intermittently, and has done much harm for a year or two and then suddenly disappeared. It was treated of by Dr. Thaddeus Harris fifty years ago as a potato pest in Pennsylvania. Since that time several of our American practical entomologists have mentioned it in their writings.

Remedy.—From the fact that the perfect beetle passes the winter in the dead stems of the plants it has attacked during the summer, an easy and effective remedy is to destroy all vines as soon as they are seen to be infested or as soon as the potatoes are dug up. The advantage of promptly destroying with fire all haulms, tops, vines, &c., of such crops as have been taken in, cannot be too strongly advised. Not only is untidy or objectionable litter thus removed and turned into useful fertilizing elements, but many injurious insects and fungous diseases are done away with, which would endanger the crop of the following year. This is particularly the case with the potato, the most destructive disease of which, the Potato Rot, propagates in the leaves

and stems which are frequently left lying about the field after the crop is dug or are piled on the top of the tubers before these are bagged.

As far as is known, this beetle feeds only on plants of the Nightshade Family, which is sparsely represented both in our native and cultivated flora. Wild plants of the thorn-apples, *Datura Stramonium*, and *D. Tatula*, as well as the wild Solanums should also all be destroyed whenever they are found growing near crops of potatoes in a district where the Potato-stalk Weevil has appeared. Prof. J. B. Smith recommends that, if the presence of the larvæ is noticed in the fields, the plants should be stimulated by the application of appropriate readily soluble fertilizers, so that the vines may be able to mature the crop despite the attacks of the weevil.

THE VARIABLE CUTWORM (*Mamestra atlantica*, Grt.).

For the last three years the moths of this species have been extremely abundant at Ottawa; and at other points in Ontario and Quebec their abundance has been noted by collectors of insects. During the past summer this moth was one of the commonest species at Ottawa around electric lights. As it is only of late years that the insect has become prevalent in the Ottawa district, and in view of the remarkable increase in its numbers, it seems not improbable that it may at some time develop into a pest of some importance. Occasional specimens of the caterpillars have been found in vegetable gardens, but as yet no reports have been received of their having done harm to any cultivated crop.

During the past season a cluster of eggs of this moth was found upon the European Honeysuckle (*Lonicera caprifolium*, L.), and the larvæ were reared to maturity and notes taken on all the stages. The larvæ were fed to various low plants, chiefly plantain, dandelion, &c., and passed through seven stages before entering the earth to pupate. The eggs were found on June 6 and had probably been laid two or three days, the first caterpillar hatched June 10, and the perfect moth emerged July 17—a life period of 37 days.

As to whether there is more than one brood in the year, is a question which requires further light. From the data at hand it is just possible that there are two broods at Ottawa. Moths have been taken as early as May 22, and from that date commonly until June 28, then again from July 31 to August 25. Those reared from eggs during the past summer emerged from July 17 until August 1. A nearly full grown caterpillar was found on October 19 in the earth, near a row of beet-roots, apparently hibernating, about an inch below the surface. On the day previous to this, another specimen which was parasitized was found in the same place on the Experimental Farm. Many of the brood of caterpillars reared from the egg, which pupated in July, are hibernating in the chrysalis state. Mr. C. H. Young, of Hurdman's Bridge, near Ottawa, also found out of doors in the fall of 1900 a pupa which gave the moth the following spring. It may be, therefore, that there are two broods of this insect in the year, namely, as follows: those which emerge in spring in May and June, either from wintered pupæ, or from larvæ which have hibernated nearly full grown and then pupated early in spring, and those which emerge in late July and during August, being from eggs laid by the moths of May and June, as in the case of those reared the present summer. The larvæ found in October are doubtless from eggs laid by the moths which fly in late July or in August. The second brood, however, may, as in the case of those reared this year, be only a partial brood, as about half of those reared emerged from July 17-August 1, the remainder wintering over as pupæ. It is possible too that the larvæ reared in confinement this year inside a building and during unprecedentedly hot weather may have emerged sooner than was natural.

The general appearance of these caterpillars may be described as follows:—The ground colour of the body which varies remarkably in different specimens of the same brood, ranges from yellowish-green, through a dull yellow ochre, a ruddy brown, to a dark umber brown. The markings may be described as minute mottlings, dots and

streaks aggregated on the dorsal area into a regular pattern consisting of a medio-dorsal continuous band, with a pale disconnected narrow line in the centre, and two lateral less connected stripes also centred with a pale thread and of about the same intensity as the medio-dorsal band. The space between the lateral stripes is closely speckled with black dots. The stigmatal stripe is black, narrow and distinct, and close beneath it is a wide conspicuous yellow substigmatal band with the ground colour showing through it in places. The ventral surface is slightly paler than the dorsal. The head is honey yellow, mottled with darker markings.

The caterpillars of *Mamestra atlantica* being cutworms, if they should ever become abundant, the ordinary remedies for cutworms may be used.

The moth of *Mamestra atlantica*, Grt., is a pretty grayish brown species with the fore wings mottled with darker brown blotches and shaded with ruddy brown or gray. The costal area which reaches to and includes the orbicular spot is distinctly grayish, the lower wings fuscous. The subterminal line which bears the W-shaped mark of the genus is white and narrow, very distinct, by reason of a dark shade between it and the margin. Superficially *M. atlantica* will be thought by the ordinary observer to bear a decided resemblance to *M. subjuncta*, G. & R. Prof. J. B. Smith has very kindly drawn me up the following memorandum describing the differences between *M. atlantica*, the closely allied *M. nevadæ*, Grt., and *M. subjuncta*. In addition to what Prof. Smith has noted, I may add that, from the examination of a large number of specimens caught in the field and several others reared from the egg in confinement, I find a very constant difference in the form of the subterminal line. In *subjuncta* this line sweeps in a gentle curve behind the apical patch and coming forward joins the base of the W-shaped mark, whereas in *atlantica* it strikes inward from the costa behind the apical patch in a straight line and then runs out again at a sharp angle beneath it. The apical patch in *subjuncta* is hardly traceable, while in *atlantica* in many specimens it is strikingly paler than the rest of the wing around it.

Notes on Mamestra atlantica, Grt., *M. nevadæ*, Grt., *and M. subjuncta*, G. & R.

Mamestra subjuncta differs at once from *atlantica* and *nevadæ* by the longer, narrower primaries, in which the anal angle is distinctly retracted. In ornamentation the obvious difference is a narrow black line extending from the end of the claviform to the t. p. (transverse posterior) line in *subjuncta*, which is wanting in both the others.

As between *atlantica* and *nevadæ*, the differences are equally great in general appearance, but more difficult to locate and define.

Atlantica is somewhat smaller, much brighter in colour, the costal region tends to become lighter throughout and the transverse lines obscure. The orbicular is oblique, narrow, elongate, the claviform narrow and pointed at tip. There is no suggestion of *subjuncta* in appearance.

Nevadæ has an obvious resemblance to *subjuncta* and hardly recalls *atlantica*. The colour is darker, the costal region is not contrastingly brighter, the orbicular is round or oval, and the claviform is short, broad and not pointed. The male organs differ markedly. See Proc. U.S.N.M. xiv., pl. viii. ff. 20 and 23 for *atlantica* and *subjuncta*. Those of *nevadæ* exaggerate the *atlantica* characters.—JOHN B. SMITH.

FRUIT CROPS.

The fruit crop of Ontario during the past season has been a very remarkable one. For the greater part of the province apples may be said to have been a failure, but in the northern counties and up through Muskoka, Manitoulin and Algoma, wherever

apples are grown, excellent crops were reaped. Plums and pears have been full crops, although the former were considerably injured in some places by aphis. In western Ontario sweet cherries were very short and the trees suffered greatly from the Black Aphis. Mr. W. S. Blair tells me that this was also the case in Nova Scotia. After the San José Scale, probably the worst enemies of the fruit grower in Ontario this year were the Cankerworms. Prof. Lochhead reports that the Cigar Case-bearer is becoming more serious every year, which he believes is due to early spraying not being attended to.

In the province of Quebec the crop was rather light, but the quality of the fruit was good and realized high prices ; this was markedly the case where attention had been given to spraying, Mr. R. W. Shepherd, of Como, a large buyer of choice apples for the British market stating unequivocally that he could only obtain first-class fruit fit for the above purpose from orchards which had been regularly sprayed.

In Nova Scotia the crop has, on the whole, been a very satisfactory one. Fruit was of good quality and the prices remunerative. Prof. Sears of the Nova Scotia School of Horticulture, says :—'The apple crop was peculiar. Perhaps never before has a finer, fairer crop of fruit been produced, but while one section is blessed with a remarkably abundant crop, another, not more than four or five miles distant, is a very light one ; doubtless, methods of culture, spraying and fertilizing are to a large extent responsible for this.'

In British Columbia the fruit crop has been a satisfactory one. Plums were abundant and there was not much complaint of disease. Apples were a heavy crop in some places but light in a few others. The quality was excellent and higher prices than usual were secured. The markets in the Kootenays, North-west Territories and Manitoba have been opened up and car-load shipments have been going forward since the beginning of the season. Mr. R. M. Palmer anticipates that there will be a very largely increased acreage in fruit next year. There was no very serious injury reported to fruits in British Columbia. Strawberry beds near New Westminster and around Burnaby were to some extent injured by the larvæ of the Black Vine Weevil (*Otiorhynchus sulcatus*, Fab.). The Imported Currant Borer (*Sesia tipuliformis*, Linn.) is reported by Mr. W. A. Dashwood-Jones as very bad this year all over New Westminster city. Another enemy which is injuriously prevalent in Vancouver Island and at the mouth of the Fraser river is the Currant Maggot (*Epochra canadensis*, Loew.). This insect attacks all kinds of currants and sometimes gooseberries. During the past summer it also occurred in noticeable numbers at Edmonton, Alta., Winnipeg, Man., and one or two places in Nova Scotia. Plant-lice were troublesome on apple and plum trees in British Columbia.

As is the case every year, many of the well known pests of the orchard have levied a heavy tribute in some localities, particularly where spraying and cultivation have been neglected.

The Codling Moth (*Carpocapsa pomonella*, L.—Mr. Linus Woolverton, Secretary of the Fruit-Growers' Association of Ontario, writes that 'the Codling Moth is still the terror of the apple-growers. It is a most serious enemy, and, if you can give us any later information with regard to the best method of destroying it we should be very glad.' Mr. Parker, Secretary of the Fruit-Growers' Association of Nova Scotia, and Rev. Father Burke, of Alberton, P.E.I., both write in very much the same strain ; but the two last correspondents also drew attention to good results where spraying has been carefully attended to. Where there is only one brood of this insect, as in eastern Ontario and from there to the seaboard, spraying after the blossoms have all fallen and the young apples have begun to form is undoubtedly the best remedy. Two sprayings, at least a fortnight apart, should be given. In western Ontario this must be supplemented with banding the trees from the middle of June. Burlap is the best material to use for the bands, and careful search must be made beneath them at short intervals to destroy the cocoons. These are sometimes rather difficult to detect as the larvæ burrow down somewhat into the surface of the bark and cover the cocoons with

the debris. The Hazeltine moth trap, so much advertised, has not given good results.

Fig. 12. — Twig infested with Oyster-shell Bark-louse.

The Oyster-shell Bark-louse (*Mytilaspis pomorum*, Bouché, = *M. ulmi*, L.) is still a persistent enemy in all parts of the country, and attacks many kinds of trees and shrubs. The remedy is spraying when the young emerge in the first week of June in Ontario, and as late as the third week in June in the Maritime Provinces, with kerosene emulsion or whale-oil soap. Spraying infested trees with a wash made by dissolving 1 lb. of concentrated lye in from 3 to 6 gallons of water, which is frequently recommended, has not given me satisfactory results in controlling the Oyster-shell Bark-louse. Mr. Macoun, the Horticulturist of the Central Experimental Farm, has been very successful in clearing the apple orchard at Ottawa from this troublesome pest by spraying with a lime wash and at the same time giving high cultivation to maintain the fertility of the soil and invigorate the trees. He sprayed the trees in autumn or early in winter with a whitewash made with one or two pounds of fresh lime to each gallon of water. As soon as the first coat had dried, a second one was applied. During the winter the lime flakes off the bark and carries with it the scales which have previously been loosened by this alkaline application

Cankerworms (*Anisopteryx*).—These caterpillars have been very destructive in western Ontario in 1901. Mr. George E. Fisher considers them among the worst pests of the season. Mr. Woolverton speaks of them in the same terms. Orchards have also been defoliated in Quebec and Nova Scotia. The remedies for these insects are early spraying, just after the blossoms have all fallen, and banding threatened trees in autumn and spring, with one of the mechanical tree protectors or with adhesive mixtures, either directly on the trees or on bands of coarse paper tacked closely and firmly around the trunk. For spraying, 1 lb. Paris green, 1 lb. fresh lime and 160 gallons of water will answer, and, if applied while the young caterpillars are small, will destroy them surely. The method of applying the adhesive mixture is explained fully in my report for 1895. The best mixtures are (1) printers' ink, 5 lbs. and fish oil, 1 gallon, which will treat about one acre of orchard. (2) *a*. For cold weather, castor oil, 2 lbs., common resin, 3 lbs. *b*. For warm weather, castor oil, 2 lbs., resin, 4 lbs. Heat slowly until the resin is all melted and apply warm. (Mr. O. T. Springer's receipt.) Mr. George E. Fisher, of Freeman, uses practically the same materials but prepares them rather differently. He says : 'For use against the Cankerworm in warm weather I use castor oil and resin (5 lbs. of resin and 3 lbs. of castor oil, and in cold weather, equal parts of all by weight). A little experience is necessary to determine just what proportions will suit the prevailing weather conditions, but they will vary between these limits. The rough bark should be carefully removed at a convenient height before applying the mixture. The first application will not remain sticky very long, being appar-

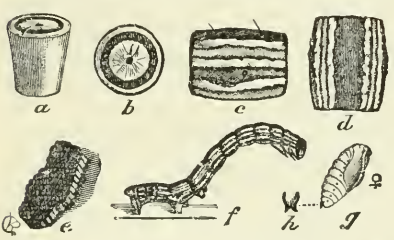


Fig. 13.—The Fall Cankerworm ; *a*, egg ; *b*, end view of egg ; *c*, mass of eggs ; *f*, caterpillar ; *e*, *d*, segments of *f* ; *g*, pupa of female—*a*, *b*, *c*, *d*, enlarged.

Fig. 14.—The Fall Cankerworm ; *a*, male moth ; *b*, female moth ; *c*, joints of antenna of *b* ; *d*, abdominal segment of *b* ; —*c* and *d*, enlarged.

ently absorbed by the bark, and a second may be necessary in about a week. This will keep fresh a good while, and is certainly a good trap for Cankerworms in either the moth or caterpillar stage. We have taken as many as 250 females on a single small plum tree. The cost of this sticky bandage and of putting it on several times amounts to a considerable sum, where many trees are involved. I am thinking of trying a collar made of tar paper.'

Tent Caterpillars (*Clisiocampa*).—Nearly all correspondents, except those from south-western Ontario, report a conspicuous absence during the past summer of Tent Caterpillars. Considerable harm, however, was done in the Niagara Peninsula, and along the north of Lake Erie. Mr. L. Woolverton writes : 'The Forest Tent Caterpillar is committing great ravages in orchards bordering upon woods. They come in great numbers from native trees to the orchards, and are very destructive and difficult to check.' When upon orchard trees, spraying with the ordinary Paris green mixture is the best remedy for Tent Caterpillars, but, at the time they spread from woodlands to adjoining orchards, they are as a rule nearly full grown. In this case, mechanical tree protectors or loose bands of cotton batting will probably be the most satisfactory way of keeping them off the trees.

Apple-tree Borers (*Chrysobothris femorata,* Fab., and *Saperda candida,* Fab.).—The recognized methods of fighting these enemies of the apple-grower, are the application of washes to the trees to prevent the females from laying their eggs, and the digging out of the larvæ in the autumn and spring, when indications of their presence are observed. Although both of these old remedies are good ones, and in many instances all that are required, there are occasionally found localities where these insects are in such numbers that some other and better remedy is still a desideratum. Mr. Francis S. Wallbridge, of Belleville, Ont., has an orchard which is situated in one of these localities where the borers seemed to defy all efforts to control them. The orchard is a young one, has received every care, and many experiments have been tried to clear it of these insects, but with little effect. It seems, therefore, necessary to try more experiments before we can claim to have a practical remedy against Apple-tree Borers. I shall be obliged if fruit-growers living in the districts infested by the San José scale will report to me whether whale-oil soap and crude petroleum, now used to a considerable extent on apple trees for the destruction of the San José Scale, do not also prevent attack from the Apple-tree Borers. A series of experiments has been planned with various mixtures containing carbolic acid, which will be reported on later. Fig. 15 shows the Flat-headed Apple-tree Borer (*C. femorata*) twice the size of nature.

Fig. 15.—The Flat-headed Apple-tree Borer : larva and beetle—enlarged.

The Rose Chafer (*Macrodactylus subspinosus,* Fab.).—This troublesome beetle, which every year does so much harm to the flowers of grape vines and to young apples, has this year been rather abundant in the Niagara district, attacking apples and peaches. Mr. H. Gordon Ball, when sending specimens, at the end of June, wrote : 'I think that in one peach orchard they have destroyed from 15 to 20 per cent of the fruit, and this year the trees require all the peaches that form to make a good crop. These beetles do not seem to eat the leaves or anything but the fruit. A wild-grape vine along the fence seemed to be alive with them. The beetles fly around the trees readily, but, when touched, they are more apt to fall to the ground than fly. Many of the peaches, when bitten by the beetles, fall off.' As has been frequently observed, the Rose Chafer is an extremely difficult insect to destroy with poisons, and a satisfactory remedy has long been wanted. Although very active during the hot hours of the day, the beetles are sluggish early in the morning, and are fond of congregating in numbers on trees upon which they feed. Many may, therefore, be

Fig. 16.—The Rose Chafer —life size.

destroyed by beating these trees over a collecting net or an inverted umbrella, to be afterwards emptied into some vessel containing water, with a little coal oil on the surface. The beetles seem to be particularly fond of certain varieties of grapes, as for instance the Clinton. When this is known, the usefulness of planting a few vines of this variety in a vineyard as a trap is apparent. These will act as decoys upon which the beetles will collect and from which they may be easily beaten and destroyed. The rose tree, in all of its varieties, and the blossom of the rhubard are also very attractive, and may be planted so as to draw off the attack from fruit trees. Prof. Webster has made the discovery (Proc. Ass'n Econ. Ent. 1899, p. 70) that 95 per cent of the adult beetles may be killed by spraying them with half a pound of fish-oil soap in a gallon of water. The suds must be thrown directly on to the beetles while they are clustered on the blossoms of the decoy plants, but spraying trees with the soap has no effect in keeping the beetles off afterwards.

Among less known injuries to fruit crops which have been reported during the past season, mention may be made of the following :—

Click Beetles (*Elateridæ*).—The food habits of these beetles are somewhat various. Although, as they are the perfect state of wireworms, which are so destructive to all classes of vegetation, they must be considered among the worst of injurious insects, yet they have been occasionally caught in the act of feeding on plant-lice. Many kinds of Click Beetles are found on flowers, and complaints of extensive injury to apple and pear blossoms have been received concerning two species, namely, *Corymbites tarsalis,* Melsh.. and *C. caricinus,* Germ. During the past summer specimens were received from Mr. M. Young, of Gardenville, Ont., of another species not previously recorded as a fruit enemy, i.e., *Corymbites cylindriformis,* Hbst., with statement that they had bitten plums, apples and other fruits. Mr. C. W. Nash, of Toronto, also forwarded specimens of the same species for name, which had been sent to him as depredators on the flowers of apples.

The Blackberry Soft-scale (*Lecanium Fitchii,* Sign.).—A remarkable outbreak of this scale insect occurred at Trenton, Ont., ample specimens of which were sent to me by Mr. John D. Evans, who stated that about eight acres of blackberries in different orchards were covered with the scales from about a foot above the ground to the top, and that the injury was chiefly on old plantations, probably ten or twelve years old. A young plantation at some little distance was very little affected. The examination, later in the season, of the material received from Mr. Evans revealed the fact that the scale insects were severely infested by parasites : A fungus, a species of *Cordyceps,* two species of small lady-bird beetles, *Hyperaspis proba,* Say, and *H. signata,* Oliv., and no less than six species of hymenoptera, *Encyrtus fuscus,* Howard, *Aphycus annulipes,* Ashm., *Coccophagus flavoscutellum,* Ashm., *Blastothrix* sp., and *Microterys* sp., all in large numbers, and, as well as these, a single specimen of a very interesting minute Proctotrypid *Eutochus xanthothorax,* Ashm., of which Mr. Ashmead, when kindly naming the above specimens, says : 'A Mymarid described fifteen years ago from Florida. (Can. Ent. XIX., 1887, p. 193.) This is the second specimen seen.' Nearly all of the same parasites were reared in equally large numbers by Mr. Evans from part of the same material collected at Trenton.

The Plum Gall-mite (*Cecidoptes pruni,* Am.).—A very unusual but rather serious injury was discovered last winter by Mr. Geo. E. Fisher, at Queenston, Ont. This was due to the small mite named above. Mr. Fisher says : 'The galls are plentiful in this one orchard at Queenston. I have not noticed them anywhere else.' In June last, Mr. Carl E. Fisher, of Dulverton, Queenston, also sent specimens, reporting that it occurred only on one of his own trees, but that he had seen it frequently on Common Blue and Red Egg plums in Queenston village. He feared that it might become a serious disease. In Europe this mite occasionally becomes a pest of some importance.

The small, shot-like galls are produced on young twigs, usually on old trees, but they have also been observed by Dr. L. Kirchner on young and healthy plants, whose death they caused. (Andrew Murray, Aptera, p. 363.)

The Peach Bark-beetle (*Phlœotribus liminaris*, Harr.).—This little bark-beetle although it only occurs in Canada, as far as I am aware, in the Niagara Peninsula, is there every year the cause of much injury to peach trees. Mr. Carl E. Fisher has for several years experimented with remedies and has kept it measurably under control. During the past season he has tried washing the trees with a strong solution of whale-oil soap, and the results are so satisfactory that I have much pleasure in making them public for the benefit of others who are troubled with this pest. Mr. Fisher writes : 'Regarding the Peach Bark-beetle, it is still a bad pest. I can see signs of it in many of the orchards throughout this section. The best remedy I have found yet is three pounds of whale-oil soap in one gallon of water, applied in the early spring, when the beetles first begin to move, and two or three times afterwards, if it is considered necessary from an examination of the tree during the summer. This is much easier made up than the formula I sent you some time ago. (Rept. Ent. and Bot., 1896, p. 225.) It is fully as effective, or more so, and of course will not injure the tree. Applied with a stiff scrubbing brush, the work is easily done.'

THE SAN JOSE SCALE.

The San José Scale is still a subject of enormous importance in that part of Ontario where it occurs. Fortunately, it does not exist in any other province of Canada, and during the past season it has spread but little beyond its former limits, but within these a great deal of harm has been done in many orchards within the area where it has secured a footing. This insect was not detected in Ontario orchards until January, 1897, and certainly was not at that time abundant in any part of the province. All statements that the insect has been in the country for ten or more years are, as far as I can find out, mistakes, or are founded on conjecture. In different localities the degree of injury to trees from this insect varies very much, but in all places, when once established, it spreads rapidly, and by the second year the trees may be coated over by the scales and rendered so unsightly as to be readily detected. Trees in this condition are always seriously injured, and, although with careful treatment they may be saved, it is usually questionable whether this is good policy, and whether it would not be better to cut down the trees and replant.

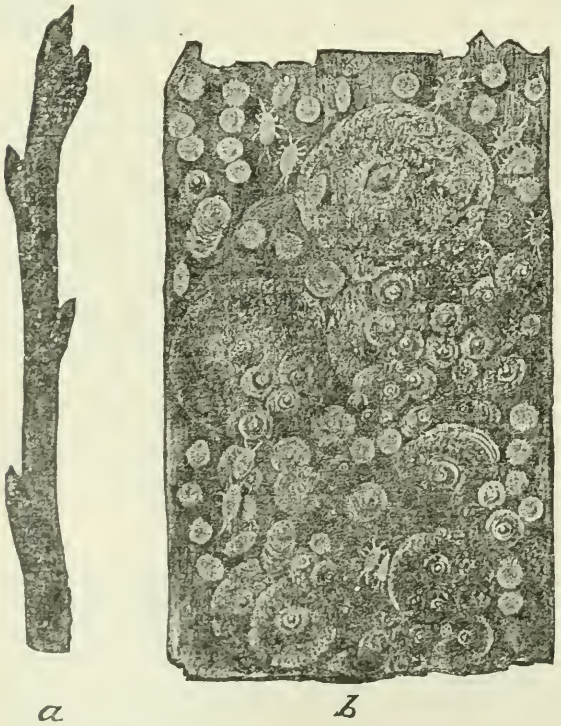


Fig. 17.—The San José Scale : *a*, infested twig ; *b*, part of the same, much enlarged.
(Cut kindly lent by the U. S. Entomologist.)

Owing largely to the excellent work which has been done by Mr. George E. Fisher, the Inspector of San José Scale for the province of Ontario, and also by Prof. F. M. Webster, in the State of Ohio, just across our borders, where the conditions are identically the same with ours in Ontario, fruit-growers are at last beginning to appreciate how important a matter it is for them to take measures to control this terrible pest as soon as they become aware of its presence on their trees. The outlook at the present time, as far as the San José Scale is concerned, seems more hopeful than it has ever been since the first announcement of its occurrence in Canada. Every effort has been put forth by the federal and provincial governments to protect fruit-growers and others from further importations of the scale, and at the same time a great deal of work has been done in distributing information through printed reports and bulletins, through addresses at public meetings, and through the agricultural press, to explain to all likely to suffer from the ravages of the insect how to recognize it, what its habits are, and what can be done to keep it in check. Extensive experiments have been tried, particularly by the officials of the Ontario Government, with all the remedies which from time to time have been suggested, and, as an outcome of all the work done in Ontario and the United States, it may now be reasonably claimed that we have three practical remedies against this worst of all known fruit pests, which are, at any rate, as effective against it as many remedies which are used with satisfaction against other injurious insects.

Injurious Nature of the San José Scale.—A vain hope which was entertained by fruit-growers in Ontario, was that all parts of Canada were too far north for the San José Scale to increase and spread to the injurious extent of killing trees. It was known that in the Southern States trees had been killed in two or three years. Some claimed that the scale had certainly been introduced into Canada for several years longer than was believed to be the case by entomologists, and as no trees had been found to have been killed by it, they thought that the danger from this insect had been overestimated by those who had studied it carefully, and that in Canada the scale would not kill trees outright in the same wholesale manner as it did in the Southern States. The experience of the past season, however, in many orchards which I have visited this autumn, at Niagara, St. Catharines, Chatham, and Guilds, near Blenheim, Ont., entirely disposes of any doubt on this score. Several trees were seen which had only been attacked for two or three years, but which were quite dead, and a great many more which, although they had not been actually killed outright, were so seriously injured that they were practically useless. I anticipate that very few of these will survive the winter. The kinds of trees which had been most injured were peach, plum, and pear, in the order mentioned ; even apple trees, which are known to resist the attack of this insect longer than other fruit trees, were found dead in some orchards which had been known to be infested for only two or three years. Others were found very seriously injured, many of the lower branches being quite dead. Some varieties of apples, and indeed of all other fruit, are more susceptible to injury from the San José Scale than other kinds are. The Rhode Island Greening seems to have small power of resistance among the best known commercial varieties of apples, and the fruit shows the presence of the scale much more conspicuously by the red blotches which are caused on the green skin, wherever they have been attacked. Among plums, the Japanese varieties suffer most. 'Of peaches, Crawfords and varieties of that type are the most susceptible. Bartlett pears are probably most affected, and Kieffers certainly least.' (G. E. Fisher.)

Rapidity of Increase.—As an instance of the rapidity with which the San José Scale spreads, I may cite one large orchard, near Chatham, Ont., consisting of 70 acres, containing over 10,000 well-grown fruit trees of various kinds—apple, peach, pear and plum. This orchard has been well pruned, cultivated, sown with cover crops, and otherwise cared for. Two years ago, infested trees were detected at four or five points through the orchard. No efforts were made to destroy the scale, and, when I visited

the place in November last, the insect could be found in every part of the orchard. I have no doubt but that, unless some treatment is given the trees next season, serious loss will ensue. In another orchard of 1,600 peach trees, near Niagara, in August, 1899, seven experienced men spent six days in making a critical examination, and found only 87 slightly infested trees. In the season of 1900, this orchard bore a full crop of fruit, but the scale insect spread through the whole orchard and could be found on every tree. By the beginning of November, 1901, many of the trees were dead, and all practically so for any commercial purposes. This was a direct result of neglect, nothing having been done to rid the trees of their enemy. Many other instances might be given, but they all tell the same tale, that the San José Scale must still be considered, as it has always been claimed to be by entomologists, the pest most of all to be dreaded by fruit-growers. These latter, therefore, as a class, should do everything in their power to back up and help the Government in its wise endeavours to protect the country from further importations from abroad and from allowing the insect to increase in Canadian orchards. Every one can help in this matter, for it cannot be denied that the chief reason that this pest has done so much harm as it has, is because fruit-growers themselves, from not recognizing the gravity of the case, have not helped, or even, in some instances, have opposed the steps taken by the Governments to control it, and, moreover, have not, in their own orchards, applied the remedies which the latest experiments have proved to be the best.

Remedial Measures Taken.—It may not be amiss to recapitulate from my last annual report the restrictions under which, by the amended San José Scale Act, nursery stock may now be imported into Canada from countries where the San José Scale is known to occur. 'When it was discovered that this insect could be killed on nursery stock by fumigating with hydrocyanic acid gas, at the urgent request of many fruit-growers, horticultural societies, nurserymen and others, by instruction of the Minister of Agriculture, proper fumigating houses were erected in the spring of 1899 at such points on the boundary as it was thought would be most convenient to importers, and qualified superintendents were appointed to treat any nursery stock, trees, shrubs and other plants as might be imported through these ports, and then repack and send them on to their destination as promptly as possible. For this purpose, fumigating with hydrocyanic acid gas, using the formula recommended by the United States Entomologist for dormant stock, was adopted, it being the simplest effective formula, viz., one fluid ounce of commercial sulphuric acid, one ounce of refined cyanide of potassium (98 per cent), and three fluid ounces of water, to every 100 feet of cubic space—exposure 45 minutes. These fumigating houses were located at the customs ports of St. John, New Brunswick ; St. Johns, Quebec ; Niagara Falls and Windsor, Ontario ; Winnipeg, Manitoba ; and Vancouver, British Columbia. The whole expense of these stations was assumed by the Dominion Government, but all shipments were made entirely at the risk of the shippers or consignees, the Government assuming no risk whatever. The packages had to be addressed so as to enter Canada at one of the above-named ports of entry, and the route by which they were to be shipped, clearly stated upon each package.

'Many horticulturists and nurserymen availed themselves largely of this concession, and at every point much stock was imported from the United States and Japan. Nursery stock of all kinds can be imported from Europe without fumigation, as the San José Scale has never gained a foothold in European countries. Certain other plants which are not liable to the attack of the San José Scale are also exempted from treatment under the San José Scale Act. These are : (1) greenhouse plants, including roses in leaf which have been propagated under glass ; (2) herbaceous perennials, including strawberry plants ; (3) herbaceous bedding plants ; (4) all conifers ; (5) bulbs and tubers ; (6) cottonwood (*Populus monilifera*), grown in Minnesota and the Dakotas.

'The fumigating houses were kept open with a superintendent constantly in attendance through the seasons of spring and autumn shipments of stock. As all vege-

tation is much earlier in Oregon and Washington States, from which most shipments are made into British Columbia. it has been arranged that for that province the fumigating house shall be kept open for the winter months from October 15 till March 15. For Manitoba and the eastern provinces the spring season is from March 15 till May 15, and the autumn season from October 7 till December 7.'

The provisions of the federal San José Scale Act have been rigidly enforced and with excellent results, for there has not been a single well-founded complaint of injury to stock, of undue delay chargeable to the fumigation or of living scales having been found on any trees in the large number of consignments of nursery stock which have been imported into Canada through the fumigation stations. The superintendents of the various stations are as follows :—At St. John, N. B., Mr. Herbert E. Goold ; at St. John's, Que., Mr. P. H. Dupuis ; at Windsor, Ont., Mr. Colborne Wright ; at Niagara Falls, Ont., Mr. O. N. Garner ; at Winnipeg, Man., Mr. A. K. Leith ; and at Vancouver, B.C., Mr. Tom Wilson. Every one of these officials has shown the greatest interest in the work and, recognizing the responsibility imposed in him, has made every effort to do the work thoroughly and well.

There has been some misapprehension in the province of British Columbia as to the exact object the Honourable Minister of Agriculture had in view when establishing the fumigating house, and it is well to state plainly that this work is being done simply and solely against the San José Scale. The length of the exposure to which the trees are subjected to the poisonous gas is calculated for the destruction of that insect alone. Incidentally, many other insects on the bark of the trees are destroyed ; but there are several, such as borers inside the wood, or insects in the egg condition, which would be little affected by the short exposure of 45 minutes, and there never was the slightest idea when the work was instituted, that these would be reached by this fumigation. From the publication in a British Columbian newspaper of a letter containing an unjust and unfair criticism of the fumigation work being done at Vancouver, it became necessary to publish an explanation of this fact in the same newspaper, the Vancouver *News Advertiser* (December 3, 1901).

In this connection it is but just to draw attention to the excellent work which has been done in Canada by the provincial Government of Ontario, through Mr. George E. Fisher, the Inspector of San José Scale, who, since his appointment, has worked most assiduously under instructions from the Honourable John Dryden, Minister of Agriculture for Ontario, in tracing up nursery stock imported before the enactment of the San José Scale Act, in inspecting nurseries and orchards, and in trying careful experiments with spraying pumps and nozzles, several important modifications and improvements of which are due to his ingenuity. Mr. Fisher has also tried every remedy which has been advised from time to time. I have had the privilege on many occasions of examining this work and can testify to the zeal and care which have been shown at all times by Mr. Fisher and his assistants. The most useful report of the Inspector of San José Scale for 1900, published by the Ontario Government last spring in time for use in 1901, ought to be read carefully by every one interested in fruit-growing in Ontario.

There is at the present time a much more decided and intelligent interest in this subject than has been the case since the first appearance of the San José Scale in Canada. Fruit-growers have learnt by bitter experience in some cases, or they have seen in the orchards of others evidence of the capabilities of the San José Scale for destroying fruit trees and the rapidity with which this work is accomplished. As a result many are now trying remedies, who a short time ago refused to believe that there was any use in them, or that any remedy was necessary.

Remedies.—The great outcry to-day is for a definite remedy. After examining the results of the Ontario experiments, and those of Prof. Webster, in Ohio, which, on account of the very similar conditions prevailing in the two areas infested, are complementary to each other, it is evident that there are three remedies, which may be called practical remedies, by which the San José Scale may be controlled to such an

extent that the owner of an infested orchard may hold the scale measurably within control and that at the same time the trees can by thorough treatment every year be kept in a condition to bear paying crops of fruit.

Whale-oil soap and crude petroleum, applied carefully as recommended below, will kill 90 per cent of the scales, and fumigation with hydrocyanic acid gas will, at a moderate expense, kill every scale on trees small enough to be covered by tents, barrels, boxes, or other tightly closing structures, of which the cost of manufacture and handling is not so great as to make the operation impracticable. What is possible on a few trees, will in time be done on many if it can only be shown that it is a paying operation. Since experiment has shown that with the below described remedies a larger proportion of the insects can be destroyed than are produced naturally every year, it is only a logical conclusion that the trees will year by year become freer and freer from this most pernicious enemy. I feel sanguine that with constant treatment, such as is year after year practised for some other crop pests, even orchards infested by the San José Scale may before long be rendered free of that pest. But regular annual treatment is absolutely necessary while there are any living scales on a tree. Where infested trees have been neglected for only a single summer, they have quickly become coated over again with the scales so as to be almost, or quite as bad, as they were before they were treated.

The three remedies which have been proved to be the best in Ontario and northern Ohio are the same which were mentioned in my last report, but further experiments during the past summer have added to our knowledge, as to the best way to apply them :—

1. Whale-oil soap.—This is a trade name for a potash fish oil soap which can either be made at home or purchased from firms in Canada, who have made a specialty of manufacturing it, with only the required amount of moisture and with the proper amount of potash. Two of the brands made in the United States, which have given good satisfaction to those who have used them in Canada, are those of W. H. Owen, of Catawba Island, Ohio, and Good & Co., of Philadelphia, Pa. To be efficient, these soap washes must be made of the strength of 2½ pounds of the soap to the imperial gallon of water, and to dissolve the soap thoroughly it is necessary to use hot water ; the mixture to be applied in the form of a spray before it cools if possible. This, however, is not necessary, because owing to the soap being made with an excess of potash, 10 or 12 per cent, the mixture will remain liquid when it cools, even at the above strength. The best time to spray the trees is just before the buds burst in spring. Although, as a general statement, orchards treated with this soap wash in Ohio were not so free of the scale as those which had been sprayed with a crude petroleum mixture, still it is a significant fact, that the two cleanest orchards of all those examined in an area of 35 miles across, which had been at one time infested and had been subsequently in a certain measure cleaned up, had been brought to their present good condition by the use of whale-oil soap. No very bad trees could be found in those orchards, and it was only with difficulty that any scales could be seen. For peach trees this remedy is decidedly the safest to use. Its only drawback is the cost of the material. In large quantities it can be purchased or made for about 3½ cents a pound, and, of the strength above advised, it would require one and a half gallons of mixture containing 3¾ pounds of soap to an average-sized full grown peach tree, making about 12 cents for material for each tree. The great advantage is that there is no danger of injuring the trees, and, further than this, the amount of potash in the soap makes it a decidedly beneficial application for the trees. There is good evidence that whale-oil soap is an excellent remedy for the fungous disease known as the Peach Curl (*Exoascus deformans,* Tul.) which for many years has caused much loss in Ontario peach orchards. It is also useful against many other insects than the San José Scale, particularly several kinds of scale insects, the Pear Psylla and others, which pass the winter hidden beneath scales of the bark of fruit trees.

2. Crude petroleum, where it has been thoroughly applied, has had a decidedly quicker and more fatal effect upon the scale insects than the whale-oil soap, but it is

also very much more liable to injure the trees treated. Crude petroleum may with care be applied to healthy peach trees in a mechanical mixture with water containing 20 to 25 per cent of the oil ; but, when using this mixture, it is rather difficult even with the best pumps made for the purpose to keep the percentage of oil constant, and, if applied carelessly by reckless, inexperienced or inattentive men, there is great risk of the trees being killed. When recently examining the results of the experiments made with crude oil on Catawba Island, Ohio, and also in Ontario, the benefit of special training of operators in this kind of work was very apparent. Where orchards had been carefully and skilfully sprayed, excellent results had followed. This was particularly the case where the work had been done by the trained Government officials, but, besides this, where good practical fruit-growers had carried out instructions carefully, the trees had been protected and paying crops had been gathered. The advantage of experience was also conspicuous in some of these orchards, the owners acknowledging that, although they thought they had done good work the first year, they could easily see that the second year's work was far better, and they believed that they would be able to do more thorough work next year and secure better results. Where trees, as was the case in some places, had been treated in an indifferent or perfunctory manner, very little good had been done, even although considerable expense had been incurred. Spraying for the San José Scale, to be effective, must be done with the greatest care as to every detail, and with great thoroughness, so that every part of the tree is reached with the material sprayed. I found that one of the most fertile causes of imperfect work was the difficulty of reaching the whole of a tree with the mist-like spray in which it is necessary to distribute the liquids. This work is facilitated very much by a wind which will help to carry the spray through the branches. Unfortunately, a change of the wind favourable for spraying both sides of the trees seldom occurs in the same day, or within a short space of time. Several fruit-growers had sprayed one side of their trees, but as there had been no favourable wind for the other side, only half of each tree had been treated. The good effect of the crude oil was remarkably apparent on some of these trees which had been only lightly infested in the spring. The side which showed on the bark the residue of vaseline left after the volatile parts had evaporated, was free of living scales, while on the other side of the same branch there was a thick coating of healthy scales reaching right up to the oily surface. Crude petroleum is a very effective and cheap remedy, but great care must be exercised in using it.

During the summer of 1901 the experiments with this substance have been earnestly watched by fruit-growers, and several have themselves experimented with it. Much good work has been done on peach trees with a 15 per cent mixture, and no cases of injury are recorded. As an outcome of this work, there will doubtless be a much more extensive use of crude petroleum oil next year. It is to be feared that the good results obtained in destroying a large proportion of the scales without injury to the trees with 15 per cent and 20 per cent mixtures may, next season, possibly give rise to a reckless or careless spirit when spraying orchards so as to get quicker and more decided results. This is a real danger and it seems most desirable to advise caution, or there may be considerable loss from trees being sprayed with too much oil. Fruit-growers must bear in mind that the application of remedies for such a persistent enemy as the San José Scale is no easy matter which can be attended to by an untrained man, unless the greatest care is exercised. From what I have seen of the work, I judge that the heavy oils are the safest and the most effective. Prof. J. B. Smith, of New Jersey, says :—'It is a fair requirement that a straight crude petroleum should have a specific gravity of 43° or over by the Beaumé oil test, at a temperature of 60° Fahr. ; anything less might be harmful ; anything more than 45° is unnecessary.' When the heavy oils have been used, the deposit of vaseline on the bark remains for a long time and without injuring the trees renders the bark unsuitable for the scales to fix themselves. The oils which have been used for the most part in Ontario are Canadian oils which Mr. Fisher tells me test 39·10° to 39°, Beaumé. Upon peach trees

crude oil should not be used in a higher percentage than 20 per cent. The safe limit for plums and pears seems to be 25 per cent, and for apples 30 per cent may be used. For peach trees, Mr. Fisher believes that not more than one quart of crude oil, costing two or three cents, should be applied to each average-sized peach tree, whether this be applied undiluted by means of a very fine specially prepared nozzle or in a mechanical mixture. The only purpose of the water in such a mixture is to act as a vehicle for the oil by which it may be distributed over a wider area as a very thin film. The water evaporates almost immediately and leaves the oil on the trees. For this reason it is important not to go over the same part of the tree twice as has sometimes been done with ill effects by thoughtless operators.

'Freeman, Ont.—The specific gravity of the Canada crude oil used against the scale was 39½° to 39°, and that of the Pennsylvania crude oil was 44½°. The Canada oil killed the scale and protected the trees from re-infestation better than the American oil, but was also slightly more trying to the peach trees. Japan plums were not injured by 25 per cent Canada oil with water, and in one instance two applications were made, the second two days after the first. The only case of injury that has come to my notice from the use of crude oil on plum trees was when it was used undiluted, and in this case Japans and the Egg varieties alone suffered.'—GEORGE E. FISHER.

3. Fumigation.—Undoubtedly the most effective remedy for small trees or bushes is fumigation with hydrocyanic acid gas which will destroy every living scale without injury to the plant. For small trees this has proved most useful, but for large trees the necessary tents and apparatus are expensive, easily injured, and handled with difficulty, particularly when there is a wind blowing. There are also difficulties which are yet to be overcome in the way of getting the gas equally diffused beneath large tents. Mr. George E. Fisher has done good work by using inverted tight barrels as gas chambers for fumigating bushes and small trees. These were ordinary tight apple barrels each of which contained 4¼ cubic feet of space and for which 1¼ grammes of cyanide of potassium, 2 grammes of sulphuric acid, and 3 grammes of water were used to generate the necessary gas. In a few instances double quantities were used without any injury to the trees. Larger trees were covered with tents. Mr. Fisher says :—'We used cyanide 20-100 and 25-100 of a gramme to the cubic foot of space inclosed, mostly 25-100, though I think that 20-100 did just as effective work in September as did 25-100. The 20-100 was exposed 35 minutes and apparently killed all of the scale. Most of the trees treated with 25-100 were exposed 45 minutes without injury and 20-100 killed the scale at 35 minutes in September. I still think there is a lot in the time of year this work is done. Prof. Lowe, of Geneva, New York, says he used cyanide in various strengths from last December to June, 18-100, 25-100 and 30-100. The 25-100 had no effect in killing the scale during low temperatures, and 30-100 used at the same time killed it all—exposure in both cases 45 minutes. In June 18-100, exposure 30 minutes, killed all of the scale. This bears out my contention that the scale is much more susceptible to the gas treatment when it is active than when dormant. It also goes to show that a stronger gas will kill it in very cold weather, which I have doubted, but which I shall take some pains to prove this winter.'

In practice it may be found convenient not to trust solely to any one of the above remedies, but to use a combination of two or more, in accordance with the difficulties which in treating any orchard may arise from many causes, dependent upon the locality, the size of the trees, or the facilities for obtaining materials. For small trees fumigation will probably be found most convenient and for large ones spraying with Whale-oil Soap or Crude Petroleum after the trees have been pruned of all unnecessary wood.

When judging the conditions of trees which have been infested by scale, or which have been treated for its eradication, it is necessary to consider, first, what the condition of the trees is at the time, and also what state, judging from surrounding trees, they would have been in if nothing had been done to relieve them. It is not always

easy to detect at first sight when a tree is in a reduced state of vigour, and hidden injury may sometimes be going on in an apparently healthy tree. In estimating the effects of a remedial measure upon a tree which fails suddenly, a close examination should always be made to see if this may not have been due to some other cause. There are many insidious insect and fungous enemies of fruit trees, such as the various wood and bark borers and root-attacking enemies. As is well known, the brush pile, containing much more than the annual prunings, is a conspicuous object on all fruit farms. Dead trees—dead from various causes—are often found in all orchards, necessitating frequent renewals. Moreover, there is always a tendency to try experiments which are considered dangerous, upon trees which are injured or thought to be of little use. If these die while under treatment, care must be taken to attribute the loss to the right cause, and not unjustly to charge all losses to the remedy. There are certain indications of impaired vigour which may be recognized at sight by an observant investigator, while others, again, are more obscure. In Ohio orchards, Prof. Webster pointed out to me—and Prof. Forbes tells me that he has noticed the same thing in Illinois—that, when a tree is from any cause in an enfeebled condition, this may be frequently detected by the well-known evidence of the presence of the Fruit Bark-beetle (*Scolytus rugulosus*, Ratz.), which burrows into the bark and causes gum to exude at the openings of the galleries. This beetle, it is thought, does not attack perfectly healthy trees, but, nevertheless, its work is frequently conspicuous on trees which as yet have not shown any evidence, by the foliage and general appearance, that they are sickly. While discussing this matter recently in an Ohio orchard with the two gentlemen above named, we found an apparently healthy peach tree, which had green leaves and was bearing fruit, but the trunk and limbs were dotted with the gummy exudations which mark the work of the Fruit Bark-beetle. Upon digging around the roots of this tree, it was found that the greater portion of the root growth was dead. This accounted for the presence of the Fruit Bark-beetle on this apparently healthy tree.

Both the Peach Bark-beetle (*Phlœotribus liminaris*, Harr.) and the Shot-hole Borer (*Xyleborus dispar*, Fab.) have likewise been wrongly charged with being the cause of fungous diseases, because they have been found abundantly upon trees only showing slight traces, or as yet none at all, of the diseases. The former of these has been thought to be the cause of the 'yellows' in the peach, and the latter has similarly been written about under the title of the Pear-blight Beetle.

Mr. G. E. Fisher drew my attention to a characteristic growth easily recognized on peach and other trees badly affected with the San José Scale, in which the tree, as an effort to save itself, throws out strong water-shoots at the base of the larger branches. This is so frequent that he has styled it the 'trade mark of the scale.' It was very apparent in one orchard of seriously injured apple trees which we visited together, near Blenheim.

THE GRAPE-VINE COLASPIS

(*Colaspis brunnea*, Fab.).

Attack.—Small pale yellowish beetles about one-fifth of an inch long, with elevated lines on the wing covers, swarming on grape vines in July, August, and September, feeding on the foliage, riddling it with small round holes, sometimes leaving little more than the veins of the leaves.

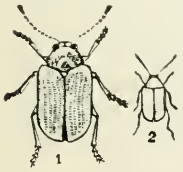


Fig. 18.—The Grape-vine Colaspis—enlarged and natural size.

During the past summer the first recorded occurrence in Canada of this insect doing damage was reported as follows:—'Queenston, Ont., July 15.—I send you three small enemies and a grape leaf. For three years I have been troubled with them. They appear in July and are on the increase until early September, when they suddenly disappear. In 1899 I had three acres of young grapes badly eaten before I noticed them. Spraying with Bordeaux mixture checks them, though does not entirely rid the vines. As no one here knows the insect nor has had trouble with

it, I take it to be an unusual visitor. Kindly tell me what it is and the best way to eradicate it.'—W. O. Burgess.

Mr. Burgess was written to that his enemy was the Grape-vine Colaspis, and informed that the remedy usually recommended was to jar the beetles from the vines early in the morning onto sheets spread beneath, when they could be collected and destroyed. He answered as follows :—

'Queenston, July 18.—Even in the early morning the beetles fly so quickly that it would not be feasible to shake them from the vines, as you suggest. I have 2,500 vines, more or less damaged at the tips, and, from the experience of the past two years, I expect next month to be the worst.'

'Toronto, November 27.—In reply to your inquiry, I tried about July 18 (when the beetles first made their appearance in any numbers), first, 4 oz. Paris green in 40 gallons Bordeaux mixture, then 5 oz., and then 6 oz., without doing any real damage to the foliage ; yet it was hardly a success. It was then that I wrote you in reference to whale-oil soap. After receiving yours in reply, as I had no soap handy, I decided to go a little stronger and used 7 and 8 oz. of Paris green and lime and water, but no bluestone. This spray mixture cleaned out all the beetles (practically) and did some considerable damage to the tips. Take it all in all, the 7 oz. should be sufficient to destroy the Colaspis, and the vines soon get over the effects of the burning. They were set back very little with me. One block of 1,188 vines of the spring planting were badly "hit"; yet, a vineyard of the same size at the other end of the farm, which as a "spring planting," was badly eaten, as a yearling block, was left alone. With me the Colaspis only attacks the spring planting and leaves the sturdier vines alone. I believe 4 oz. of Paris green is not sufficient, and another year I will use 7 oz. and try and get them early. If I remember correctly, the beetles appeared the same time each year, about the 15th July.'—W. O. Burgess.

The life history of the Grape-vine Colaspis has been studied by many investigators. Dr. C. V. Riley published an article on the subject in his *Third Missouri Report,* and Prof. Forbes has also treated of it at length in his *Thirteenth Report,* p. 156.

The injury by this beetle is, as was noticed by Mr. Burgess, largely confined to the tender foliage of young grape vines. There are many plants, however, which are occasionally attacked by it in either the larval or perfect form. Among other plants, injuries have been reported upon strawberries and beans, upon which the attack is frequently of a serious nature, the roots of strawberries being injured by the larvæ, and the leaves of strawberries and beans being destroyed by the beetles. Other plants attacked are the potato, clover and the dock. The beetle has also been noticed devouring the silk of corn before the kernels had been fertilized.

Dr. Riley was of the opinion that this insect should have been considered primarily a strawberry pest. He says, *Missouri Rep. 3,* p. 83 : 'We are now treating of this insect as a grape-vine pest ; but it is difficult to say whether the Crown-borer (*Tyloderma fragariæ*, Riley) or this root eater is the most injurious to the strawberry. The work of the two is esentially different, the white Crown-borer confining itself to the crown, and its more dingy ally devouring the fibrous roots and working into the more woody part from the outside. At this work several of them frequently may be seen with their heads stuck into different parts of one root. They may be found upon the roots all through the fall, winter and spring months, and do not begin to change to pupæ in this latitude till the month of June. The beetles appear during that month and continue to issue till towards fall.' After leaving the ground the Grape-vine Colaspis beetles feed for a short period on the young leaves of the strawberry and do some injury. After feeding for a time, they deposit their eggs and fly to the vineyards, where they are found, as was the case in Mr. Burgess's vineyards, about the middle of July.

The remedies which have been recommended are the application of poisonous mixtures to the foliage and the shaking of the beetles from the vines very early in the morning before they become active. Whale-oil soap has been found very effective

against some beetles which are little affected by poisonous mixtures, such as the Rose Chafer (*Macrodactylus subspinosus,* Fab.) and the Striped Blister-beetle (*Epicauta vittata,* Fab.), and it is probable that it might also be useful against this chrysomelid. It would be well worthy of a trial, should the beetles be found again next year either upon strawberries or afterwards when they have flown to the vineyards. The whale-oil soap now largely used by fruit growers in western Ontario is a fish oil soap containing a large percentage of potash.

FOREST TREES.

The only insect enemy of forest trees which has been the subject of considerable correspondence and which has attracted public attention, is the Birch Skeletonizer (*Bucculatrix canadensisella,* Cham.). It seriously disfigured birch trees in all parts of Ontario and in some parts of the province of Quebec in late summer. The insect was treated of fully in my report for 1892, when a similar abundance of the insect occurred. In the following year very few birch trees were injured and since 1893 nothing has been seen of it until this year. It is to be hoped that we may experience next year a similar disappearance of this enemy to the birch.

A NEW ENEMY OF CONIFERS

(*Semiophora youngii,* n. sp., J. B. Smith, ms.).

A very interesting new species of noctuid moth belonging to the genus Semiophora was discovered during the past summer to be a pest of some importance to tamarack or American Larch (*Larix Americana,* Mx.) and the Black Spruce (*Picea nigra,* Poir.). The moth, which is a very beautiful species, was reared from the larva, and the first specimens were discovered by Mr. C. H. Young, of Hurdman's Bridge, near Ottawa, a most enthusiastic and painstaking entomologist, as well as a successful breeder of insects. The species has been named in honour of the discoverer, by Prof. John B. Smith, the leading specialist in this group. The first moths were taken by Mr. Young in August, 1899. On May 30 last I visited the Mer Bleue, an extensive peat bog near Ottawa, in company with Mr. Young and Mr. Arthur Gibson. On entering the swamp it was at once apparent that some insect was stripping the young tamaracks and spruces, and after a short search we discovered that this had been done by a strikingly handsome noctuid caterpillar about an inch and a half in length when full grown, of a rich velvety brown, with a ruddy or greenish tinge in different specimens, the dorsal area showing the richest colours and bounded on each side by the white clear and threadlike lateral stripes. The dorsal stripe of the same intensity as the lateral stripes. The spiracles black and lying on the upper edge of a broad white substigmatal band, the lower surface much paler than the dorsal, the whole body finely mottled with small purplish brown spots. The centre of each segment on the dorsum is darker and more velvety than the intersegmental fold. The head is reddish brown finely mottled with lighter spots.

A large number of these larvæ were collected and a fine series of the moths was reared. The moth, as stated above, is a very beautiful species and varies so much that, had not the specimens all been reared from larvæ which showed little variation, it might have been supposed that at least two species were represented. The moth measures about an inch and a quarter across the wings and varies in the ground colour of the wings from a warm gray almost to a velvety black, the usual lines and marks of the noctuidæ are distinct in most specimens and, as a rule, heavily shadowed inside with a darker shade of the ground colour. The area beyond the subterminal line is strikingly paler than the rest of the wing, except the reniform mark, which is almost

white and conspicuous. The hind wings are fuscous. A detailed scientific description of this moth will be published by Prof. Smith.*

The moths appear at the end of August, and in the early part of September. Specimens reared in confinement and those taken under natural conditions appeared about the same time. Up to the present this species has not been taken in any other locality than in the peat bog above mentioned, but, judging from the devastation and the large number of larvæ which were collected by three of us in about an hour, this species might at any time develop into an injurious forest tree pest. The caterpillars, although well protected by their mottled appearance when on the trees, have the interesting habit of leaving the branches during the day time and hiding deep down in the sphagnum moss at the base, where they in some instances penetrate to the depth of 6 or 8 inches. The moths in nature were found by Mr. Young to rest beneath the branches and were strikingly protected by the resemblance of their mottled closed wings to protuberances on the bark of the branches.

THE APIARY.

The Apiary, under the management of Mr. John Fixter, has been tolerably successful during the past season, both as to yield and as to the interest evinced by visitors. The season has been a fair one for honey, and prices have been good. An evidence of the value of bees in orchards was provided by the poor crop of apples in western Ontario. It was noted by many fruit-growers that during the time that apple trees were in blossom there were no bees flying, and, as a consequence, little fruit was fertilized.

The colonies at the Central Experimental Farm Apiary were housed for the winter in good condition and, as far as can be judged at this date, are wintering well. Several meetings of bee-keepers were attended by Mr. Fixter, where he delivered addresses on practical apiculture and took an active part in the discussions. I myself was honoured by being invited to be one of the three speakers to represent the National Bee-keepers' Association of America at the first joint meeting of the bee-keepers and the American Pomological Society. This important meeting was held at Buffalo on September 13 and 14, during the Pan-American Exposition. The title of my address on this occasion, by request of the association, was 'How flowers are fertilized, with special reference to the Honey Bee.' This was in connection with the subject which had recently been so keenly discussed, whether bees could injure ripe fruit, when the skin of this was unbroken. During the past season, Mr. Fixter, at my request, has carried out a few experiments to test this question. These, as far as they go, are of considerable interest and tend to exonerate bees from all blame in this matter.

REPORT OF MR. JOHN FIXTER.

The season of 1901 has been a pretty good one for bee-keepers. Ontario reports show little or no disease among bees. There has been plenty of swarming, and stocks have been strong and active. But for the hot weather of July an immense yield would doubtless have been recorded. The average yield, however, will not exceed 50 pounds per colony. Some excellent basswood honey is reported and a fair share of clover honey. Quebec reports mention some excellent returns, some as high as 100 pounds per colony; the average will probably be 75 pounds. The colonies are in splendid condition for wintering.

Returns from the Central Experimental Farm Apiary average 68 sections or 79½ pounds of extracted honey per colony.

* Since the above was written this description has appeared. See *Can. Ent.*, XXXIV., p. 29.

Meetings at the following places were attended and addresses delivered :—Cumberland, Chard, Rockland, Dunraven, Ont. ; Calumet Island, Que. ; Gananoque and Woodstock, Ont.; and at the American National Bee-keepers' Association at Buffalo, N.Y. Many apiaries were visited near Ottawa during the past summer, and it was noted that all bee-keepers are increasing the number of their colonies very fast and greater interest is being taken in bee culture.

Experiments with different kinds of Hives for comb and extracted honey.

Two hives of each of the following sorts were used :—the Langstroth, the Hedden and two other kinds more or less used in Canada, one measuring 15 x 15 x 12 inches, the other 15 x 20 x 15 inches. Eight colonies of bees were selected all of about the same strength and having good laying queens. The results from the four kinds of hives are shown in the following table, one hive of each kind being arranged for section honey, the other for extracting honey. The hives are tabulated in the order of the returns they gave.

Hive.	Swarms.	Sections produced.	Extracted honey.
			Lbs.
1. Langstroth	1	67	79
2. 15 x 15 x 12 inches	1	56	63
3. Hedden	0	54	62
4. 15 x 20 x 15 inches	0	0	23

The large hive 15 x 20 x 15 inches appears to be too large ; the bees building up well in the brood chamber but not going up into the surplus boxes, either in sections or extracting frames.

Further Experiments in feeding Sugar Syrup for Winter Stores.

During the autumn of 1900, an experiment was started with four colonies. All the natural stores were removed on September 17, 1900. A Miller feeder was placed in an empty section super, close to the top of the brood frames, any part of the brood frames not covered by the feeder being covered with a propolis quilt cut so as to allow the bees a passage through it. By keeping the feeder well packed around, except where the bees enter, the heat is kept in and at the same time the bees cannot daub themselves with the liquid. In this experiment the bees had a constant surplus of syrup. This syrup was made of the best granulated sugar, two parts to one of water by weight. The water was first brought to a boil, then the boiler was set back on the stove and the sugar having been poured in the mixture was stirred until the sugar was all dissolved. This syrup was supplied to the bees at about blood heat. When put into winter quarters the wooden covers were removed and replaced with a chaff cushion ; the hives were also given extra ventilation at the bottom by placing at the entrance a wooden block between the brood chamber and the bottom board, raising the front of the brood chamber about 2 inches extra. During December and January considerable, though not excessive, humming could be heard. During February and March and until they were set out, there was but very slight humming. There was no sign of uneasiness nor any dysentery during the whole winter. Each colony when put into winter quarters weighed on an average 52½ lbs. ; when taken out in the spring, 40 lbs. 10½ oz. The hives were set on their summer stands April 1, 1901. The bees then began to work at once and built up rapidly and were in excellent condition when the honey flow came on. During the summer each hive gave one swarm and made on an average 78 sections of honey. This experiment will be continued with the same colonies and their progeny for several seasons.

Experiments with Foundations of different sizes in Sections.

Experiments have been continued with comb foundations of different sizes in sections. There were in each hive four sections for each size of foundation.

(1.) Full sheets fastened at the top and fitting closely to the sides and down close to the bottom.

(2.) Half sheets fastened at the top of the section.

(3.) Quarter sheets.

(4.) Two inches square, fastened in top centre of section.

(5.) One inch square, fastened in top centre of section.

(6.) No foundation at all.

No. 1.—Full sheets of foundation gave the best results ; the bees began to work on them first and filled them out better. When the sections were shipped, they did not break so easily, and consequently they brought the highest prices.

Nos. 2 and 3.—Very few of the sections which had only one-half or one-quarter sheets of foundation were well filled ; in no instance were they filled as well as those with full sheets.

Nos. 4 and 5.—The bees did not begin to work in these sections until they had the full sheets nearly all drawn and filled. Several sections were only half finished.

No. 6.—The bees did not start to work in any section where there was no starter. From this and many other experiments the advisability of always using full sheets of foundation is apparent. This should be of soft thin wax so that it will not be noticeable when the comb-honey is eaten.

Experiments with Brood Foundations of Different Sizes.

(1.) Full sheets. (2.) Half sheets. (3.) Two-inch strips of foundation across the tops of the frames.

(1.) Full sheets in every instance appear to be the best ; the bees go to work on them at once and they build all worker comb on the foundation ; a few drone cells are sometimes built where the comb does not touch the bottom or sides of the frame ; this alone is quite an advantage. Moreover, the sheets are securely wired, making them fit for either brood or extracting frames ; they will also stand a heavy swarm, or shipping without breaking down. (2.) Half sheets.—The bees built worker comb as far as the foundation went, then the balance drone comb. (3.) Strips of Foundation.—In this instance the bees started to work, not in the frames, but in the sections in the super, which had full sheets of foundation, sooner than in No. 1 and 2. Queen excluders had to be put on to prevent the queen going up into the super. The combs in the brood chamber were very unevenly built so that the frames could not be lifted out without the combs being broken, and some of these combs were more than half drone cells. They could not be used for extracting frames, as, not being wired, they were too weak. From the results of this experiment and the previous one, it is therefore plainly better in all cases to use full sheets of foundation both in the sections of the supers and in the frames of the brood chambers.

Experiments to test whether Bees injure Sound Fruit.

For many years the question as to whether sound fruit was injured by honey bees has been under discussion, but last year special attention was drawn to this question by a law-suit between a fruit-grower and a bee-keeper, the former claiming that his fruit had been seriously injured by the bees of his neighbour, while the bee-keeper brought evidence to show that not only was this not the case, but that it was impossible. This question was of so much interest to bee-keepers that the following experiments were undertaken to determine whether bees, even when deprived of food, would attack fruit placed within their reach. The results here given indicate that such is not the case, which merely confirms the conclusions arrived at many years ago.

Prof. Slingerland, of Cornell University, in an article in the Rural New Yorker of November 10, 1900, cites the experiments which were carried out in 1885, by Mr. N. W. McLain, of Aurora, Ill., by instruction of Prof. Riley, United States Entomologist, from which these conclusions were drawn. (See U.S. Ent. Rep. 1885.)

On September 7, 1901, when there was no surplus honey to be gathered on plants outside, ripe fruit of four different kinds, viz., peaches, pears, plums and grapes, was exposed in different places near the Experimental Farm Apiary where it was easily accessible to the bees—

(*a.*) Inside bee hives ;

(*b.*) On branches of trees in the apiary inclosure ;

(*c.*) On shelves in a work-shop to which bees had access through an open window.

Every care was taken that all the fruit used in this experiment should be perfectly sound.

A.—Fruit exposed inside bee hives.

The fruit was exposed in three different conditions : (1.) Whole fruit without any treatment ; (2.) Whole fruit which had been dipped in honey ; (3.) Fruit which had been punctured in several places with the blade of a penknife.

Four colonies were selected for this experiment, all of about equal strength. Each of these colonies was in a hive upon which was placed a super divided in the middle by a partition. From two of the hives the honey had all been removed, in the two remaining hives five frames were left, each having considerable brood, with honey around it. The former two at the beginning weighed on an average 27 pounds, the latter two 34½ pounds. In each one of the four hives, the whole specimens of fruit not dipped in honey were hung within three empty frames, tied together as a rack ; the whole specimens of fruit dipped in honey were placed in one compartment of the super and the punctured specimens were placed in the other.

The bees began to work at once both upon the dipped and the punctured fruit ; the former was cleaned thoroughly of honey during the first night ; upon the punctured fruit the bees clustered thickly, sucking the juice through the punctures as long as they could obtain any liquid.

At the end of seven days all the fruit was carefully examined. The sound fruit was still uninjured in any way, but had the surface polished and shining as if the bees had been travelling over it trying to find some opening through the skin. The dipped fruit was in a like condition, quite sound, but every vestige of the honey had disappeared. The punctured fruit was badly mutilated and worthless, beneath each puncture was a cavity and in some instances decay had set in.

The experiment was continued the following week, the undipped sound fruit being left in the brood chamber ; the dipped fruit was given a new coating of honey and replaced in the super, and a fresh supply of punctured fruit was substituted for that which had been destroyed.

At the end of the second week, the condition of this fruit was entirely similar to that of the first lot.

For the third week fresh samples of fruit of all the above kinds were used, because some of the sound fruit had begun to decay ; this fruit, however, had the skin unbroken, and in no case had the bees done any damage. The results were the same as before.

After the third week the bees belonging to the two hives which had been deprived of all the honey appeared to be very sluggish, and there were many dead bees about the entrances of the hives. These colonies had lived for the first three weeks on the punctured fruit, and on the honey off the fruit which had been dipped. As there were at that season few plants in flower from which they could gather nectar, these bees had died of starvation notwithstanding the proximity of the ripe, juicy fruit. This supply of food, which they were urgently in need of, was only separated from them by the thin skin of the fruit, which, however, this evidence seems to prove they could not

puncture, as they did not do so, although they kept crawling over it continuously.

The mean weight of each of these two hives on the 7th September, when the experiment was begun, was 27 pounds. At the end of the experiment, four weeks later, each had lost 3½ pounds. The mean weight of the two hives in each of which were left five frames with brood and honey, was at the beginning of the experiment, 34½ pounds. The mean loss for each of these hives was 2¼ pounds.

B.—Fruit exposed in the open air, hung from the branches of a tree in the apiary inclosure.

In this experiment two sets of whole fruit were used, one being dipped in honey, the other punctured as before. The bees worked exactly as in the hives and with the same results.

C.—Fruit exposed on shelves in a workshop, adjoining the honey-house.

This, like the preceding experiment, consisted of dipped fruit and punctured fruit. Although the bees did not work so freely inside this building as they did on the fruit hung outside on the trees, and that in the hives, still the results were practically the same in every case.

Answers to Correspondents.

Question 1.—One of my hives is full of webs and grubs. What is the remedy ?

Answer.—The grubs are the caterpillars of the Bee Moth (*Galleria mellonella*, L.), more properly called the Wax Moth, the most troublesome of the enemies of the bee-keeper. Fig. 19 shows it in its different stages. The full grown caterpillars or 'grubs' shown at 19*a*, natural size, are very active, of a dirty white colour, when full grown about an inch in length. They sometimes occur in large numbers in neglected hives, and eat long galleries through the comb, feeding on the wax and the bee bread in the cells, destroying also any young bees that come in their way, and finally driving the colony from the hive. The eggs of the Wax Moth are very small, oval, glistening white at first, but assume a pink colour before hatching. They are inserted by the mother moth into any crack or crevice in or about the hive, by means of a long tube-like ovipositor. As soon as the young caterpillars hatch they begin to spin, as a protection, a silken tube in which they live during their whole larval life. This tube is enlarged and extended as they progress. When full grown they leave these tubes and creep into a crevice or corner, generally near the bottom of the hive, where they spin a tough cocoon (Fig. 19*b*) of white silk mixed with pellets of black excrement. The pupa (Fig. 19*c*) may be found inside the cocoon. The perfect insect is figured of natural size, a female with wings expanded, at *d*, and a male at rest at *e*. There are normally two broods of this moth in the season, the first appearing in May and the second, usually much more numerous, in August. In infested combs brought into a heated office for study, the moths appeared at the end of March and through April well into May. The moths are of various tints of dusky gray and differ a good deal, some being much lighter in colour than others, and some specimens of both sexes being of a more ruddy brown. They are not easily seen when at rest, as in colour they resemble very closely old weathered wood, a resemblance which is heightened by numerous dark spots on the wings. The peculiar shape of the wings, as is shown in the figure above, will easily enable any one to identify this insect. The moths are about three-quarters of an inch long, and when at

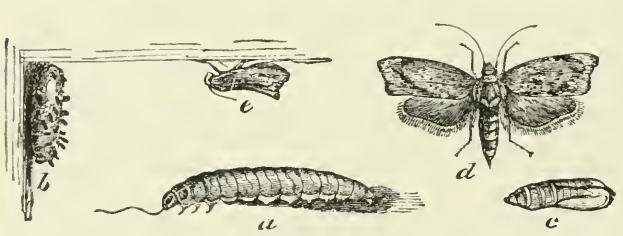


Fig. 19.—The Wax Moth ; *a*, caterpillar ; *b*, cocoon ; *d*, female moth ; *e*, male moth at rest.

rest the wings are folded so as to leave a narrow flat space at the top, and then slope downwards abruptly. When disturbed they run with great rapidity and slip quickly beneath any available shelter. They fly with ease and enter bee hives about dusk for the purpose of laying their eggs.

The indications of the presence of the Wax Moth grubs in a hive are well known to most bee-keepers. If the little black pellets of excrement, like small grains of gunpowder mixed with bee-bread or broken cappings, are at any time noticed on the bottom board around the entrance, the hive should at once be carefully examined, and steps taken to remove any caterpillars that may be found. If attended to promptly while the grubs are few in number, this is an easy matter, but if they are neglected and allowed to increase, as they will very rapidly in the spring, much destruction will be wrought in a surprisingly short time. When a grub is detected, it should be picked out with a knife or other sharp instrument (a pair of fine but stiff tweezers will be very convenient) and crushed. There will, of course, be some injury to the comb, but this the bees will soon repair. When the grubs occur only in small numbers, the bees will, as a rule, if the colony be of proper strength, keep them down themselves. Italian bees are rarely injured by moths. The wide-awake bee-keeper will also provide against weak and queenless colonies, which from their enfeebled condition are the surest victims to moth invasion. No bees either Italian or Black will be troubled so long as the combs are covered with bees. If through carelessness a colony has become thoroughly victimized by these wax devourers, the bees and any combs not attacked should be transferred to another hive, after which the old hive should be fumigated with sulphur, then by giving one or two of each of the remaining combs to strong colonies, after killing any pupæ that may be on them, they will be cleaned and used ; while by giving the weak colony brood and, if necessary, a good queen, it will soon recover.

The following experiment was carried out. Two hives which had been deserted by their swarms in the autumn, were left in the bee yard until the bees were taken into the cellar for the winter; both hives were full of empty combs and had many evidences of the presence of the Wax Moth grubs. One of these hives showed more injury than the other. The one which had the most grubs was closed up tightly and was left in the house apiary for the winter, where it was exposed to the winter frosts to destroy the grubs. It was examined at different times and was kept in the same place until the swarming season the next year, when, as all the grubs of the Wax Moth were killed, it was given to a new swarm, and was as good as if there had never been a grub in it. The other hive, which at first showed the least symptoms of injury by the Wax Moth, was kept in the bee cellar where the temperature would average about 45 degrees during the winter. This hive was also tightly closed at the top and bottom like the former, so that no moth could either get in or out. In the spring, when carried out at the time the bees were set out, it was found to contain hundreds of grubs and winged moths. The comb had been entirely destroyed and was bound together into a solid mass by the webs. From this experiment and others (See Report Entomologist and Botanist, 1895, p. 174-177), it is clear that freezing is a good method to keep down the Wax Moth in all localities where the thermometer drops to zero (Fahr.) during the winter.

All empty combs should during the winter be suspended from strands of wire stretched across a dry shed, so that they will be safe from mice, but at the same time exposed to the full intensity of the winter cold. During the summer while not in use all empty combs should be kept in a dark cellar and examined at short intervals.

Question 2.—How should bees be packed for shipping in hot weather ?

Answer.—During hot weather great care must be exercised that bees are not smothered or their combs melted, by the great heat which is generated inside the hive when insufficient ventilation is provided during transit. To ship long distances it is necessary to remove both the top and bottom boards of hives and cover both the top and bottom with fine wire cloth. The covers must be put back again as a protection,

but over, and raised from, the wire cloth, which must be carefully tacked over the two ends of the brood chamber. The boards are supported at each corner on blocks one inch by one inch, and about two inches long, with a single screw through each to hold it in its place. The wooden covers which are supported by the blocks are also made fast by screws. The entrance must be covered with wire cloth. For short distances the bottom board may be left undisturbed. It is almost absolutely necessary that combs should be wired, or at least that they be old and tough and securely attached to the bottom bar. It is always risky, however, to ship combs when not wired, for it is impossible to tell what sort of rough usage the package may receive at the hands of express agents. The bees buzzing around the wire cloth are usually sufficient to guarantee gentle handling, but, as many people do not know how to handle and take care of bees, plain instructions should be placed on each hive.

Question 3.—Is it safe to move bees from one part of the apiary to another ?

Answer.—A great many mishaps have come about from moving bees unwisely. A little thought in regard to the habits of bees will save this. Bees fly from their hives, when looking for honey, one or two miles, but seldom farther than that, unless at a time of great scarcity of pasturage. After a bee has once learnt the location of its hive, it never stops to take the points when leaving the hive, as it does the first time it sallies out in a new locality. The consequence is, if a hive has been moved either by night or by day, bees will when returning with honey fly straight to the old location, and, if on reaching that they find the hive is gone, they are helplessly lost and, even though the hive may be only a few rods away, they will not find it. Whenever hives are moved even short distances during the working season, there is always, as a consequence, a loss of some of the bees. Italian bees, as a general thing, make themselves at home in a new location more readily than the Black bees, and stick more tenaciously to their home and brood. Sometimes shaking the bees down in front of the hive and letting them run into it again, like a natural swarm, will be sufficient to make them stick to a new locality.

Another plan, which has been tried successfully, is to take the hive away for an hour or two until they get really frightened at the loss of their home. They will then all go in eagerly as soon as the hive is brought back to them again. In this case they seem so glad to get their old home again that they will stay in it wherever it is placed.

Sometimes when it has been necessary to move a colony, we have succeeded by first moving the hive to its new location, then placing an empty hive with a comb in it on the old stand for the returning bees to cluster on, because many of them, after leaving the hive in its new location, will not be able to find their way back to it again and will go back to the old stand. These must be taken back to their new location and shaken out close in front of the hive just before dark.

The best plan to follow, when it is necessary to move colonies, is to place a piece of board, or hang an old sack over the front of the hive, so that the bees, when they come out, will recognize that there is a striking change in their surroundings and will circle round and round the hive to take their bearings. These obstructions may be removed after one day, and no further trouble will be experienced.

Question 4.—I have a great many sections half full ; can I mix honey, sugar and water and let the bees finish them ? If so, what proportion of each would be best ?

Answer.—Do not think for one minute of using even the smallest proportion of sugar to finish sections. If you want to feed to have sections finished, use diluted honey, but very few bee-keepers have been able to make it pay. It is better to sell at a reduced price sections that are not finished and let the bees empty out any that are less than half full. Pile up, out of doors, supers of sections you want bees to empty, and allow entrance for only one or two bees at a time. If you allow a larger entrance, the bees will tear the comb to pieces. Sections partly filled may also be fed to weak colonies or those colonies which have not sufficient stores for winter in the following

manner : First, place a propolis quilt over the brood, turn back one corner for an opening, place a super full of one-half filled sections above, uncap all parts of the sections that are not already uncapped, and the bees will very soon empty them and take the honey into their brood chamber. The emptied sections may then be taken off and put away for future use. A good plan to dispose of partly filled sections is to cut each one into small pieces, say two or three, according to amount in them, and sell them at exhibitions, &c.

JOHN FIXTER.

DIVISION OF BOTANY

MAPLE SEED BLIGHT

(*Fusarium*, sp.).

During the past summer a serious enemy to the Ash-leaved Maple (*Negundo aceroides*, Mœnch) appeared at Indian Head and in the surrounding district. An account of this outbreak was reported to me by Mr. George Batho, of the *Nor'-West Farmer*, and, when Dr. Saunders was making his annual visit of inspection at Indian Head, specimens were collected and sent to Ottawa. Material was, at the same time, sent to Mr. Galloway, of the Department of Agriculture, Washington, who reports upon it as follows : 'The maple seeds are thoroughly infested with a fungus resembling *Fusarium*. This fungus is undoubtedly the cause of the failure of the seeds to fill. It is very difficult to combat diseases of this kind on such large trees as the maple. The spores of the fungus are very abundant at present on the seeds, and undoubtedly much might be done to prevent a recurrence of this trouble by gathering the diseased seeds and burning them. If possible, the trees should be sprayed with some good fungicide like Bordeaux mixture. It would be best to do the spraying next season, beginning early and repeating the applications at intervals of about two weeks until the danger is over. It is possible that it would not be practicable to spray, in which case very little can be done except to gather the diseased seeds and burn them.'

Dr. Saunders found the seeds on maples similarly injured in the vicinity of Regina, and as far as Pense. On reaching Medicine Hat, however, the seed on the trees was found to be perfectly healthy. The importance of the Ash-leaved Maple as a shade tree in the West can hardly be over-estimated, and millions of young trees are every year being grown from the seed. Should this disease which has the effect of destroying the kernel of the seed before it fills out, continue, it will be necessary for those wishing to grow young trees from the seed to obtain the seed from some other locality. The disease is, I believe, a temporary outbreak, and hardly likely to last for any great length of time. There is no record of seeds having been similarly affected in previous years.

When trees are affected with this disease the seeds begin to show the injury by the edges of the wing becoming bleached and spotted, and the seeds fail to fill. There was very little indication of this injury to maple seeds when I was at Indian Head in the beginning of July, but it was very noticeable by the middle of August. Mr. D. G. Mackay, who has charge of the forestry plantations at the Experimental Farm at Indian Head, estimates the loss at 90 per cent of the whole crop of seeds. This is a serious loss, as every year large quantities of this seed are collected for distribution to those who wish to plant them.

THE POPLAR RUST

[*Melampsora populina*, (Jacq.) Lév.].

In travelling through the North-west Territories last summer I found the Aspen Poplar (*Populus tremuloides*, Mx.) very badly affected by the fungous disease, known

as the Poplar Rust [*Melampsora populina*, (Jacq.) Lév.], kindly identified by Prof. L. R. Jones, of Vermont. Many apparently healthy trees were remarked in the month of July to have very small and sparse foliage at the tips of the uppermost branches. Subsequently these dropped their leaves and the foliage of many trees became yellow. Later the rust developed conspicuously on the lower parts of Aspen trees, over a wide area of territory.

Mr. Geo. Batho, of the *North-West Farmer*, who is very observant of everything affecting crops of all kinds, sent me specimens of diseased foliage in August last, stating that the rust had been exceedingly destructive to foliage of both poplars and birches all through northern Alberta, the trees in many places being much disfigured and stripped of their leaves. The fungus on the birch foliage proved to be *Melampsora betulina*, (P.) Tul. Both the Aspen and the Birch referred to (*Betula occidentalis*, Hook.) are indigenous in the North-west and are highly valued for planting as ornamental trees on account of their compact growth and beautiful intense green foliage. In the arid country of the interior of British Columbia the beauty of the Aspen is very striking, and, with the sturdy handsome Bull Pine (*Pinus ponderosa*, Dougl.), forms one of the characteristic features of this part of the Dominion. The disease was not observed west of the main chain of the Rockies, but was very apparent in northern Alberta, and was exceedingly destructive to the foliage of the Cottonwood (*Populus monilifera*, Ait.) at Brandon, Man. One row of young trees of this poplar had been so severely attacked for two years running that most of the trees were dead or in a moribund condition when Dr. Saunders visited the Experimental Farm at Brandon in August. Specimens were sent off by him to my address in Ottawa, but knowing that I was then absent in British Columbia, he sent specimens also to Mr. Galloway, the Chief of the Bureau of Plant Industry at Washington, which were reported upon by Mr. A. F. Woods, the Pathologist and Physiologist :—

'I have borne in mind your request for information relative to rust of *Populus monilifera*, and take pleasure in supplying the following data, furnished by our Mycologist, Mrs. F. W. Patterson :

'The disease is caused by the fungus *Melampsora populina* (Jacq.) Lév., and occurs on various species of Populus in this country and in Europe. The uredospores and teleutospores are found on the same leaves, the former causing the yellowing and early fall of the leaves and the latter hibernating on the fallen leaves. The æcidial stage has not been determined with absolute certainty, but Rostrup demonstrated by experiments that the teleutospores of *Melampsora tremulæ*, Tul., which is now thought to be synonymous with *M. populina* on *Populus tremula*, germinate on the leaves and shoots of young pines, giving origin to *Cæoma pinitorquum*. The æcidiospores from the pine in turn produce the uredosporic and teleutosporic stages on the poplar leaves. Hartig also proved that the same Melampsora causes *Cæoma laricis* on the needles of the larch. These experiments, however, were made entirely upon foreign trees, and, so far as our knowledge goes, cultures of spores of *M. populina* and infection experiments with them in this country have been entire failures.

'The Hatch Agricultural Experiment Station, Amherst, Massachusetts, has been conducting experiments with fungicides on *Populus nigra* for several years, with a view of preventing or controlling the disease. In the section in which the Hatch Station is located, the fungus appears during the hot, moist weather of July and August, and, when abundant and appearing at the earlier date mentioned, it kills many of the branches, and the leaves become yellow and fall to the ground.

'The uredo, or summer spores, are formed while the leaves are still on the tree, and are soon scattered by the wind, causing the infection to spread with great rapidity. Spores develop on the fallen leaves, and these spores, which are capable of living over winter, upon coming into contact with new leaves in the spring or summer set up new infection.

'It is said that by the use of Bordeaux mixture the trees have been kept in a perfectly healthy condition. In the experiment four applications of the fungicide were made, two in July and two in August. You could doubtless secure copies of the several bulletins relating to the disease by applying to the Director of the Hatch Station. Account of the poplar rust as it occurs in Europe, is given in Hartig's Diseases of Trees, Tubeuf and Smith's Diseases of Plants, and Geo. Massee's Text Book of Plant Diseases.

'We have in our herbarium specimens of affected *Populus monilifera* collected in Dakota, Illinois, Indiana, Iowa, Kansas, Massachusetts, Montana and Nebraska.'

In view of the large number of cottonwoods which have been imported into Manitoba and the North-west Territories for planting groves, it is important that all information possible should be given concerning this disease, which may at any time develop under favourable climatic conditions and do much harm. Most of the young trees used by planters in the West are imported from Minnesota and Dakota as seedlings, which are collected in large numbers from river banks when one year old. Dr. Saunders noticed particularly that none of the varieties of poplars which had been imported from Russia had so far developed the Poplar Rust. If they should continue to show this immunity, their importance will be very much increased for the West, where already they are highly valued for their rapid and luxuriant growth.

Mr. S. A. Bedford, reporting at the end of the season on this matter, says :—'The rust was very bad indeed on our cottonwoods on the side hill just east of the house. The trees were four or five years old, made excellent growth and were very thrifty in former years, but this year they were one mass of rust. The cottonwoods by the creek side in the valley were apparently free from rust. I noticed a small amount on the native Aspen Poplar, but nothing very serious. So far the Russian Poplar has done exceedingly well with us here and is a better tree in every respect than the cottonwood, except perhaps when the latter is on wet land or on the side of a creek.'

Mr. D. G. Mackay writes that the cottonwood and Russian Poplars were quite free of rust at Indian Head, and were this year of particular beauty.

FODDER PLANTS.

Awnless Brome Grass.

Ever since the institution of the Experimental Farms a constant effort has been made to foster the cultivation of the Awnless Brome Grass (*Bromus inermis*, L.) in the more or less arid districts of the West. The success which has attended this effort is most gratifying. Thousands of acres of valuable hay and pasture are now being cultivated where but for this grass there would be nothing but exhausted prairie. Knowing that an actual instance is of far more value than much argument, I have requested Mr. C. W. Peterson, the Deputy Commissioner of Agriculture for the North-west Territories, to give me an account of an experiment he tried with this grass. He is so well known and his farm being accessible to so many, his letter will do much, I feel sure, to prove the great value of this grass for the West for hay and pasture, and as a seed crop.

'Regina, November 15, 1901.—I am in receipt of your letter of the 16th ultimo, in which you ask for certain information respecting the crop of brome grass on my farm at Calgary. As you are aware, on irrigated farms in the Calgary district, the cultivated hay crops are entirely limited to timothy, for the simple reason, that you cannot dispose of brome hay in the Kootenay district. This fact, I attribute entirely to ignor-

ance on the subject and feel certain that if a few car-loads of brome hay were pressed and sent in there on trial, a market would soon be created for it. I have a knoll on my irrigated land which cannot be reached by gravity and I, therefore, decided to seed it down with grass suitable for arid districts and picked on brome. This patch covers about eight acres, or a little less. The land was seeded down in 1897, I have forgotten just now the exact quantity of seed I used per acre. It was, however, below ten pounds. I got a good sample of hay the first year and cut about a ton per acre in 1898. In 1899, I cut about a ton and three-quarters per acre, and in 1900, I cut for seed. The latter cutting yielded me 3,300 lbs. of seed, which I sold at 11 cents per pound, receiving $368.50, and as I had an abundance of feed, I sold this brome straw, 15 tons, for $3 per ton. The eight acres gave me a return of $413.50 all told.'—C. W. Peterson.

REPORT OF THE AGRICULTURIST.

(J. H. Grisdale, B. Agr.)

Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith reports on Dairy Cattle, Beef Production, Pork Production, Sheep, and Farm Crops.

As in previous years, much of my time has been taken up attending various agricultural and live stock meetings in different parts of Canada, and, further, during the past summer I was absent 16 weeks securing a number of pure-bred cattle, sheep, and swine for the various farms under your supervision.

I am deply indebted to Mr. John Fixter, farm foreman, to Mr. C. T. Brettell, herdsman, and to Mr. J. Meilleur, dairyman, for interested and careful assistance in the various departments immediately under their charge and for help in the preparation of the submitted report.

To Mr. J. F. Watson, secretary to this division, my thanks are due for the interest and care he has displayed in the clerical work, and for the most efficient manner in which he has handled the new work of the dairy herd tests.

From December 1, 1900, to November 30, 1901, 1,470 letters were received by the Agriculturist division, and during the same period 1,533 letters were despatched.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

CATTLE.

There are on the farm at present representatives of three breeds of cattle, viz., Shorthorn, Ayrshire, and Guernsey. There are besides several grade animals of each breed ; that is, heifers or cows from a common or grade cow by a pure-bred bull of one of the above named breeds.

PURE-BRED BREEDING CATTLE.

The pure-bred cattle are as follows :—

Shorthorns.

1 bull calf, Lord Dinsdale (imp.) 6 months old.
3 cows (imp.), 3, 5 and 8 years old.
2 cows, 10 and 12 years old.
2 heifers (imp.), 1 year old.
1 calf (imp.), 4 months old.

Ayrshires.

1 bull, Twin Beauty (imp.), 2½ years old.
4 cows (imp.), 3 to 6 years old.
3 heifers (imp.), 2½ years old.
1 heifer, 1½ years old.

Guernseys.

1 bull, Wedgewood, 7 years old.
1 bull calf (imp. in dam), 5 months old.
4 cows (3 imp.), 3 to 6 years old.
1 cow, Canadian bred, 3 years old.
1 heifer, 18 months old.
1 heifer calf, 5 months old.

Most of these cattle were imported, as indicated above. Some, however, were bred by the Experimental Farms, and two cows were bred in Ontario.

The two Ontario bred cows took part in the dairy test just concluded at the Pan-American Exposition, Buffalo. One is Miss Molly, red, calved April 10th, 1889. She was bred by J. W. Rosser, Denfield, Ont., and sold to R. S. and T. E. Robson, Ilderton, Ont., from whom she was secured to take part in the above mentioned dairy test. Her dairy record was a good one, standing, as she did, first among the Shorthorns, and fifteenth among cows of all breeds. She produced in 6 months 6,894·1 pounds of milk, with an average of 3·71 per cent fat. From this milk it was estimated that 301·47 pounds of butter could have been produced. This, valued at 25 cents per pound, was worth $75.37. She cost to feed during the six months : for hay, $7.23 ; for silage, $4.96 ; for grain, $20.17, amounting to $32.36, making a net profit of $43.01 on butter alone. Besides producing such a large amount of milk, she gained in weight to the amount of 134 pounds.

The other cow, Queen Bess, red and a little white, calved October 10, 1891, was bred by James Gardiner, Farquhar, Ont. She passed into the possession of Wm. Montutle, Thames Road, Ont., from whom she was secured to become one of the herd of five dairy Shorthorns as mentioned above. Here she made a good showing, standing second in the Shorthorn herd and 34th among cows of all breeds. She produced in 6 months 6,547·9 pounds of milk, testing 3·57 per cent fat. This milk, it was estimated, contained 275·21 pounds of butter, which, valued at 25 cents per pound, was worth $68.80. She cost to feed during the 6 months, for hay, $7.21 ; for silage, $5.30 ; for grain or meal, $19.98, amounting to $32.49 in all. This left a net profit of $36.31 on butter alone. During the 6 months she gained 192 pounds in weight.

LIVE STOCK IMPORTATIONS.

June, July, and part of August was spent by the writer among the herds and flocks of Great Britain and the Channel Islands, the purpose being to study the methods of British cattle-breeders, as well as to secure a few head of pure-bred cattle, sheep, and swine for the Dominion Experimental Farms. It was decided that the cattle importation should consist of heavy milking Shorthorns, Guernseys, and Ayrshires.

Shorthorns.

The famous herds at Collynie and Tillycairn belonging to William Duthie, of Tarves, N.B., as well as Uppermill herd, the property of W. S. Marr, were visited in the north, while those of His Majesty the King, at Windsor, of J. Deane Willis at Bapton Manor, of J. T. Hobbs, at Maisey Hampton, of Sir Nigel Kingscote, at Kingscote, and many others were seen in the south.

The animals finally purchased are :—*Lord Dinsdale*, bull, dropped June, 1901, was so unfortunate as to lose his dam a few weeks after his birth and has had since to depend on the pail for his upbringing. In spite of his troubles he has done well and offers to make a fine animal. He is a light roan with an abundance of thick mossy hair, lots of style, strong lines and, for one of his age, grand masculine character. He is from the long established Berkeley Castle herd, the property of Lord Fitzhardinge, at Berkeley, Gloucestershire. This herd is under the able management of

1. Leicester Ewe. 2. Leicester Ram Stanisson. 3. Leicester Lambs.
4. Shropshire Ram (Imp. Minton bred). 5. Shropshire Ewe (Imp. Mansell bred).
6. Shropshire Lambs (Imp. Mansell bred).

James Peter, the famous judge of Shorthorns. Bates blood runs in every strain there, and no expense has been spared to secure the best, both as to character and pedigree. Lord Dinsdale's dam, a light red of unusual scale, was a very heavy milker from a very heavy milker ; his sire has also good breeding for milk production.

Lunesdale Marchioness.—A magnificent roan, dropped in November, 1896, and the dam of two beautiful heifers, is in calf to Land's End. She has a good record as a milk producer, and it is hoped to found a deep-milking family with her off-spring.

This cow, as well as Illuminata mentioned below, were bred by Edmund Potter, Esq., Lowfields, Kirkby Lonsdale, Westmoreland. Mr. Potter's herds have been bred for years as general purpose cattle and any cows not good milk producers are weeded out after the first calf. His cattle are a wonderfully uniform lot, sweet, smooth and well fleshed.

Illuminata.—A deep fleshed red, dropped in 1899, is from the heavy-milking cow Lustre, and is in calf to Land's End.

From the herds of Mr. Scott Murray, Hambleden, Henley-on-Thames, was secured the deep-milking cow *Darlington Lass.* She has a well-established milk record, and puts all her feed into the pail. She is in calf to *Hopeful Lad,* and something good is hoped for.

Jessica Elmhurst.—Dropped in July, 1901, is from the same herd and from the best cow of the herd. She is a dark red and is faultless in Shorthorn character and conformation.

Janet.—A light roan cow calf, dropped in October, 1900, is a sweet, smooth, deep-ribbed, well-fleshed, broad-fronted and strong-backed animal from Jubilee, by Union Jack. The dam is 13 years old and a cow of superior milking properties, and better Shorthorn characteristics is hard to imagine. Ten months after dropping the calf Janet she was still yielding 35 pounds (3½ gallons) of milk daily. She is the great dairy Shorthorn of the famous Duffryn Dairy Shorthorn herd. This herd, the property of Richard Stratton, Esq., The Duffryn, Newport, Mon., has been famous in the show ring and dairy tests for over forty years, and still holds its own, as witness the first prize yearling heifer at the Royal Agricultural Society show at Cardiff this year, bred and owned by Mr. Stratton.

From Jas. A. Peter, Esq., Berkeley, Glos., the roan cow calf, *Duchess of Vittoria 39th,* was secured. Though not so deep-fleshed nor having quite such good lines as Janet, she is probably of a sweeter Shorthorn type and is worthy of her Duchess descent, tracing back, as she does, to the famous Bates Duchesses and Waterloos. She is by North Star from Duchess of Vittoria 34th, a strong, heavy-milking red cow.

Guernseys.

A large number of Guernsey herds were visited in England, and finally a selection of a bull and three cows was made from probably the premier Guernsey herd of England, that of Lady Tichborne, Tichborne Park, Alresford, Hants, managed by David Michie, Esq.

The bull, Golden Rule, an orange fawn, dropped in 1899, has every indication of being a good sire. He has been sent to the experimental farm at Nappan, N.S., as well as Itchen Lady, a rather plain little cow of fairly good milking points.

Clatford Spot, a strong, deep coloured animal, is to represent the breed at the experimental farm at Indian Head, N.W.T., while Lily of Alderney, a finer-boned, lighter-coloured and rather more milk producing type of animal, will remain at the Central experimental farm.

Two cows were secured on the Island of Guernsey, where several days were spent among the herds. The cows selected were Honoria VIII a light fawn, white spots, dropped 1898, and in calf to Francis Masher II. She was bred by Alfred Lepatourel, Esq., La Ramee, Guernsey. In mid-Atlantic she dropped a bull calf, which offers to make a fine animal. Coming as he does from a cow of such beautiful Guernsey quality and deep-milking properties as Honoria VIII., by a sire so famous as Francis Masher II. much is hoped for.

Deanie IX., bred by T. R. Gallienne, was dropped 1898. She made a good milk record with her first calf and is from a most excellent dairy cow. She is a light fawn with white, and is a good dairy type. She is rather plain at the til, however, and was bought for performance rather than appearance.

Ayrshires.

Before any individuals of this breed were secured several of the best herds in Scotland were visited, and notes made of their chief characteristics.

It was finally decided to buy from Mr. Andrew Clement, of Glasgow, the bull Twin Beauty. This bull, brown with white spots, was dropped in 1899. He was bred by Robert Wallace, Esq., Auchenbrain, Mauchline. His dam, Old Beauty's Last, has a record of over 70 lbs. of milk in one day on grass alone. He is by Daniel of Auchenbrain, whose dam has a record quite equal to Old Beauty's Last. These two wonderful cows were still at Auchenbrain in August, and cows more nearly ideal in type can scarce be imagined.

Mr. Andrew Clement, from whom the bull was secured, is an enthusiastic Ayrshire breeder, and at great inconvenience to himself rendered invaluable services in the search for the right class of animal.

From Mr. Wallace, Auchenbrain, were secured 4 excellent two year old heifers by the famous bull Daniel of Auchenbrain, now in Australia.

From Mr. Robert Woodburn, Holehouse, Galston, were secured three cows : Nora's Last, a stylish, deep milking, good teated animal, 6 years old, Rosy, a good milking cow of a rather less striking appearance, and Soncy, a trim, neat, sweet and tidy little animal with good dairy points. Soncy goes to Nappan, with one of the Wallace heifers.

Culcaigrie.—From the hills of Galloway were brought two cows, among the best in all that land, Jessie A., of Culcaigrie and Maggie of Culcaigrie.

Jessie A. was the winner of the famous Queen's Hill cup, now the property of her breeder, he having won it three times. Maggie also took part in the winning of this beautiful trophy for her one-time owner, William Stroyan, Esq., Culcaigrie, Twynholm, Kirkcudbright.

Jessie A. is a cow of grand proportions, beautiful lines, great strength and splendid Ayrshire character. She stands a queen among dairy cattle anywhere. Maggie is smaller and something weaker, but withal has good lines, is clean cut, and is going to be a worker, as well as a thing of beauty.

DAIRY CATTLE.

The herd of dairy cattle during 1901 consisted of 29 females all told. They are:—

MILKING STOCK.

Ayrshires	1
Guernseys	1
Ayrshire grades	9
Canadian grades	2
Shorthorn grades	4
Guernsey grades	2

YOUNG STOCK.

Shorthorn grades—	
Two year olds	2
Calves	1
Ayrshire grades—	
Two year olds	2
Calves	1

Guernsey grades—
Two year olds 1
Calves 3

On the arrival of the imported stock, several grade dairy cows were sold to make room for the new animals. Such aged cows and young cattle were retained as were fairly good representatives of grades of the breeds, Shorthorn, Ayrshire and Guernsey.

FEED OF THE DAIRY CATTLE.

The roughage ration fed during the year of 1901 was practically the same as that fed in 1900, namely, 35 lbs. ensilage, 20 lbs. mangels, 5 lbs. clover hay, and a little chaff. This ration was varied to suit the size or capacity of the cow. The meal ration consisted of different mixtures at different times. Bran, oat chop, barley meal, and pea meal made up a considerable portion of the grain ration, but gluten entered very extensively into the concentrate ration during the winter months.

GLUTEN MEAL.

This feed is proving of great value as a milk producer. It appears to be suited for winter dairying, as it forms a good supplementary ration for mangels or corn ensilage. It is open at present to the objection that it is not constant in composition. It is apparently difficult to get two samples even from the same factory alike in protein or fat content, while feeds under the same name from different factories are quite different in appearance and vary in protein and fat content by as much as 20 per cent. This uncertainty of composition is very objectionable and must be guarded against most carefully.

MILK YIELD.

The average milk yield of the herd has increased from 6,455 lbs. in 1900 to 6,760 lbs. in 1901. The butter yield per cow for 1900 was 289·6 lbs., while in 1901 each cow made 319 lbs., an increase of 29·4 lbs.

SUMMER FEEDING.

The dairy cattle during the first part of the summer were, as usual, pastured on the fifth year of the rotation ; that is, on land from which one year's hay had been cut. In August and September they were allowed to have part of the clover meadow aftermath of the fourth year of the rotation. In addition to this they were given some clover ensilage, (see page 302). Only a small amount of meal (3 lbs. ground oats per cow) was fed to such as were giving a large flow of milk and to heifers in the first period of lactation.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during 1901, save in the case of ensilage and roots, which are charged at the usual values affixed in experimental work :—

Pasture	$ 2.00	per cow per month.
Bran	15.00	per ton.
Oats, gluten meal, barley and pease	19.00	"
Clover hay	6.00	"
Chaff	4.00	"
Roots and ensilage	2.00	"

In estimating the value of the product, 19 cents per pound is allowed for the butter and 15 cents per hundred pounds for the skim milk and butter-milk. The butter is manufactured in the farm dairy and sells on the market at from 22 to 30 cents per pound, an average of 25 cents during the year. This leaves 6 cents per pound for cost of manufacture.

The following tables give in detail the particulars concerning each cow and the herd statement for the month :—

Number.	Name of Cow.	Breed.	Age.	Date of dropping last calf.	Number of Days in Milk in 1901.	Daily Average of Milk.	Total Milk for Year.	Per cent of Butter Fat.	Pounds Butter.	Value of Butter at 19 cents per lb.	Value of Skim Milk at 15 cts. per 100 lbs.	Total Value of Products.	Cost of Feed.	Profits.	Remarks
						Lbs.	Lbs.			$ cts.	$ cts.	$ cts.	$ cts.		
1	Julia	Ayrshire Grade		Dec. 26, 1900.	320	36·6	11,707	3·60	496	94 24	16 50	110 74	42 82	67·92	
2	Dora	"		Jan. 17, 1901.	300	33·0	9,893	3·40	396	75 24	13 80	89 04	42 80	46·24	
3	Bell	"		Feb. 14, 1901.	283	33·7	9,536	3·90	438	83 22	13 50	96 72	40 57	56·15	
4	Bloom	"		Nov. 11, 1900.	342	27·0	9,252	3·80	414	78 66	13 05	91 71	43 99	47·72	
5	Della	Shorthorn Grade		Jan. 20, 1901.	280	27·7	7,769	4·00	366	69 54	10 65	80 19	40 85	39·34	
6	Laura	Ayrshire "		Nov. 2, 1900.	300	25·5	7,668	3·50	316	60 04	10 50	70 54	32 70	37·84	
7	Begonia	Canadian "		April 7, 1901.	290	26·2	7,598	3·60	322	61 18	10 50	71 68	33 45	38·23	
8	Countess	Ayrshire "		Jan. 6, 1901.	310	24·2	7,527	4·00	354	67 26	10 25	77 51	40 00	37·51	
9	Florence	Shorthorn "		April 2, 1901.	320	21·7	6,940	4·10	335	63 65	9 60	73 25	35 25	38·00	
10	Polly	Ayrshire "		Dec. 7, 1900.	295	22·8	6,750	4·30	341	64 79	9 20	73 99	36 42	37·57	
11	Dairymaid	Shorthorn "		Mar. 15, 1901.	270	24·6	6,640	3·90	305	57 95	9 00	66 95	33 42	33·53	
12	Darling	Ayrshire.		Oct. 8, 1900.	309	21·1	6,330	4·50	335	63 65	8 60	72 25	26 42	45·83	
13	Bellflower	Guernsey Grade		Jan. 17, 1901.	305	20·3	6,216	4·50	329	62 51	8 50	71 01	36 85	34·16	
14	Forest Girl	Shorthorn "		" 1, 1901.	280	22·0	6,170	3·60	261	49 59	8 50	58 09	38 45	19·64	
15	Queenie	Guernsey "		Dec. 28, 1900.	320	16·7	5,363	5·70	360	68 40	7 35	75 75	30 30	45·45	
16	Winnie	Ayrshire "		Jan. 4, 1901.	225	22·1	4,974	4·20	246	46 74	6 75	53 49	35 30	18·19	
17	Ruby	Guernsey		Aug. 10, 1901.	270	13·8	3,740	5·40	238	45 22	4 80	50 02	33 43	16·59	
18	Hazel	Canadian Grade		July 16, 1900.	170	18·3	3,116	4·10	150	28 50	4 05	32 55	38 06	−5·51	Loss.
19	Dewdrop	Ayrshire "		" 10, 1901.	100	12·5	1,258	4·10	60	11 40	1 80	13 20	8 45	4·75	
					5,280	24·3	128,447	4·01	6,062	1,151 78	176 90	1,328 68	669 53	659·15	Aggregates.
					278	24·3	6,760	4·01	319	60 62	9·31	69 93	35 24	34·69	Averages.

MONTHLY STATEMENTS.

—	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	Total.
No. of cows giving milk.	17	19	17	17	17	17	16	16	16	16	14	16	
Lbs. of milk in month	7,657	9,989	11,073	13,552	13,530	14,191	13,991	13,440	12,076	9,525	7,277	6,262	132,563
Average for 1 day	247	322	395	437	451	458	466	433	389	308	234	209	
Daily average per cow.....	14½	17	23	26	26½	27	29	27	24	19¾	17	13	
Per cent fat...	4·40	4·32	4·22	4·16	4·28	4·37	4·16	4·15	4·08	4·55	4·45	4·47	
Lbs. butter fat	336·90	431·52	467·28	563·76	579·08	620·14	582·02	557·76	492·70	433 38	323·82	279·91	5668·32
Lbs. butter...	396·35	507·66	549·73	663·25	681·27	729·57	684·73	656·19	579·65	509·86	380·96	329·31	6668·61
Lbs. of milk for 1 lb. butter..	19·3	19 6	20·1	20·5	20·2	19·4	20·4	20·5	20·8	18·7	19·1	19·0	

EXPERIMENTS WITH DAIRY CATTLE.

As stated elsewhere, a number of Shorthorns, Ayrshires and Guernseys were imported in 1901. The females, with the addition of a few grades of each breed already in the stables, will make up the dairy herds for 1902, and some succeeding years.

There will be three distinct herds with a subdivision in each as follows : Shorthorn herd, and Shorthorn grades : Ayrshire herd, and Ayrshire grades ; Guernsey herd, and Guernsey grades. Account will be taken of the produce in calves and milk in both pure-bred and grade herds. A strict account will be kept of the food consumed by each individual animal.

Experiments during the past year have been carried on along two lines ; to determine the effect of milking at unequal intervals and to gain some information as to the comparative value of some different rations fed in different ways. Reports on these follow :—

HOURS OF MILKING.

The experiment to ascertain the influence of hours of milking upon the amount of milk produced, and upon the quality of the same has been continued, and three separate experiments are summarized in the tables which follow.

The cows are usually milked here at 6 o'clock a.m. and 4.30 p.m. When milked at equal intervals during the experiment the hours were 6 a.m. and 6 p.m. By 'Period of change' in the following tables is meant the week succeeding the change of milking hour from 4.30 p.m. to 6 p.m. in order to make the intervals between milkings of equal lengths or *vice versa*.

Average.	Average for previous 10 days.	First period of change.	Milking equal intervals.	Second period of change.	Milking unequal intervals.	Remarks.
DARLING.—Autumn Test.						
Per cent of fat, morning	3·5	3·80	3·78	3·87	3·56	
" " evening	3·9	3·61	3·75	4·35	4·21	
" " whole day	3·7	3·71	3·76	4·18	3·86	
Daily average yield butter fat	1·061 lbs.	1·037 lbs.	0·988 lbs.	1·102 lbs.	0·993 lbs.	
HAZEL.—Autumn Test.						
Per cent of fat, morning	3·9	4·70	4·46	4·41	4·17	
" " evening	4·1	4·27	4·41	4·51	4·55	
" " whole day	4·0	4·49	4·43	4·46	4·36	
Daily average yield butter fat	0·960 lbs.	1·055 lbs.	0·923 lbs.	0·903 lbs.	0·889 lbs.	
RUBY.—Autumn Test.						
Per cent of fat, morning	4·5	5·75	6·27	5·68	5·45	
" " evening	4·9	5·65	6·20	6·35	6·26	
" " whole day	4·7	5·70	6·24	6·01	5·85	
Daily average yield butter fat	0·654 lbs.	0·627 lbs.	0·664 lbs.	0·578 lbs.	0·608 lbs.	
THERESA.—Autumn Test.						
Per cent of fat, morning	3·5	3·70	4·83	4·57	4·46	
" " evening	3·9	4·36	4·70	4·82	4·71	
" " whole day	3·7	4·03	4·76	4·69	4·58	
Daily average yield butter fat	0·662 lbs.	0·585 lbs.	0·576 lbs.	0·672 lbs.	0·616 lbs.	
DARLING.—Winter Test.						
Per cent of fat, morning	4·0	4·2	4·0	3·7	3·8	
" " evening	4·0	4·5	4·1	4·1	4·1	
" " whole day	4·0	4·35	4·05	3·9	3·95	
Daily average yield butter fat	1·000 lbs.	1·073 lbs.	1·051 lbs.	1·02 lbs.	1·002 lbs.	
DORA.—Winter Test.						
Per cent of fat, morning	3·3	3·6	3·3	3·2	3·2	
" " evening	3·4	3·8	3·3	3·5	3·4	
" " whole day	3·35	3·7	3·3	3·35	3·3	
Daily average yield butter fat	1·474 lbs.	1·695 lbs.	1·133 lbs.	1·524 lbs.	1·076 lbs.	
DEWDROP.—Winter Test.						
Per cent of fat, morning	4·3	5·0	4·7	4·2	4·3	
" " evening	4·6	5·3	4·5	4·4	4·6	
" " whole day	4·45	5·15	4·6	4·3	4·45	
Daily average yield butter fat	·489 lbs.	·511 lbs.	·468 lbs.	·464 lbs.	·401 lbs.	
COUNTESS.—Winter Test.						
Per cent of fat, morning	3·5	3·6	3·7	3·6	3·6	
" evening	3·7	3·8	3·5	4·0	4·0	
" whole day	3·6	3·7	3·6	3·8	3·8	
Daily average yield butter fat	1·008 lbs.	1·011 lbs.	1·014 lbs.	1·166 lbs.	1·002 lbs.	

Average.	Average for previous 10 days.	First period of change.	Milking equal intervals.	Second period of change.	Milking unequal intervals.	Remarks.
	LAURA.—Winter Test.					
Per cent of fat, morning	3·6	3·8	3·5	3·4	3·4	
" evening	3·6	3·8	3·5	3·5	3·7	
" whole day	3·6	3·8	3·5	3·45	3·55	
Daily average yield butter fat	1·044 lbs.	1·072 lbs.	·983 lbs.	1·010 lbs.	1·010 lbs.	
	DAHLA.—Winter Test.					
Per cent of fat, morning	3·8	4·0	3·8	3·9	3·8	
" evening	3·9	4·1	3·9	4·0	4·0	
" whole day	3·85	4·05	3·85	3·95	3·9	
Daily average yield butter fat	·988 lbs.	·940 lbs.	·888 lbs.	·982 lbs.	·919 lbs.	
	DAIRYMAID.—Summer Test.					
Per cent of fat, morning	4·2	4·5	4·5	4·5	4·9	
" evening	4·4	4·5	4·6	5·1	5·3	
" whole day	4·3	4·5	4·55	4·8	5·1	
Daily average yield butter fat	·860 lbs.	1·176 lbs.	1·022 lbs.	·849 lbs.	·895 lbs.	
	BLOOM.—Summer Test.					
Per cent of fat, morning	3·8	3·5	3·7	3·6	3·8	
" evening	4·2	3·7	3·7	4·2	4·1	
" whole day	4·0	3·6	3·7	3·8	3·95	
Daily average yield butter fat	·640 lbs.	1·041 lbs.	·925 lbs.	·907 lbs.	·655 lbs.	
	BELLFLOWER.—Summer Test.					
Per cent of fat, morning	4·2	4·3	4·4	4·3	4·6	
" evening	4·4	4·2	4·2	4·9	5·1	
" whole day	4·3	4·25	4·3	4·6	4·85	
Daily average yield butter fat	·989 lbs.	·902 lbs.	·819 lbs.	·815 lbs.	·815 lbs.	
	BEGONIA.—Summer Test.					
Per cent of fat, morning	3·2	3·6	3·6	3·4	3·5	
" " evening	3·6	3·8	3·6	3·5	4·1	
" " whole day	3·4	3·7	3·6	3·45	3·8	
Daily average yield butter fat	1·292 lbs.	1·262 lbs.	1·059 lbs.	·907 lbs.	1·134 lbs.	
	FLORENCE.—Summer Test.					
Per cent of fat, morning	3·4	3·7	3·9	3·7	3·9	
" " evening	3·6	3·9	3·9	4·1	4·4	
" " whole day	3·5	3·8	3·9	3·9	4·15	
Daily average yield butter fat	·875 lbs.	·877 lbs.	·863 lbs.	·833 lbs.	·801 lbs.	
	BELL.—Summer Test.					
Per cent of fat, morning	3·8	4·0	3·9	3·6	3·9	
" " evening	4·2	3·9	3·9	4·3	4·3	
" " whole day	4·0	3·95	3·9	3·95	4·1	
Daily average yield butter fat	1·160 lbs.	1·283 lbs.	1·190 lbs.	1·108 lbs.	1·018 lbs.	

A study of the above records would tend merely to emphasize the conclusions reached in last year's experiment, namely :—

1. That the percentage of butter fat in milk, from morning or evening milking, is influenced by the comparative length of interval between the milking hours.

2. The richer milk is found to be produced after the shorter interval.

3. Where intervals between milkings are equal, no appreciable difference appears to exist in either the quality or quantity of the milk drawn in the morning or in the evening.

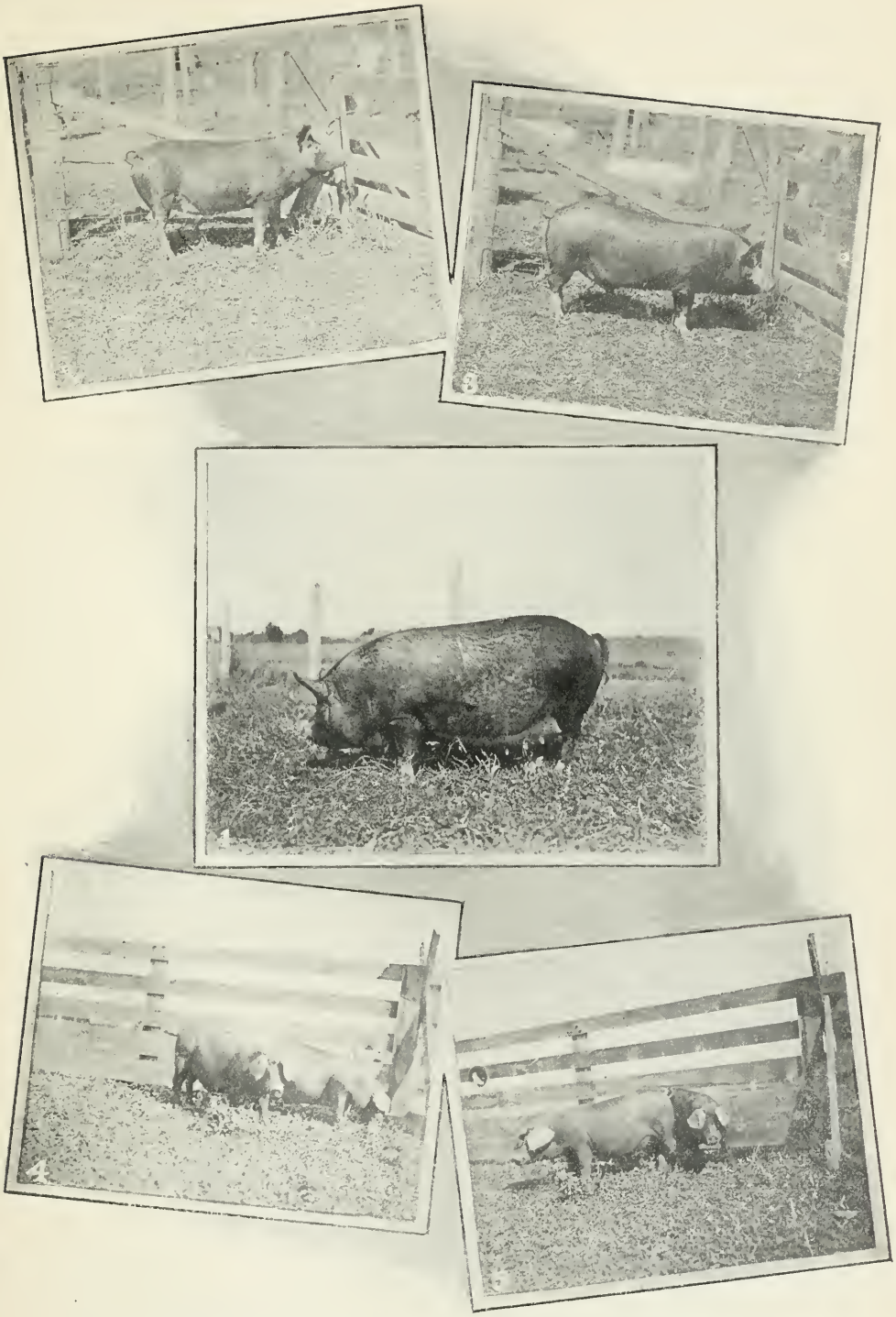
Periods of change in hours of milking are evidently periods of excitement and affect individuals differently.

COW FEEDING EXPERIMENT.

DRY VERSUS WET FEED.

Feeding cows barley, oats and oil meal dry versus bran and gluten meal wet.

As a study of the tables will reveal, the two lots of cows of three each were fed for seven days on similar rations. On the eighth day the rations were changed, both lots being fed ensilage and hay, but lot 1 being given a meal ration of barley, oats and oil meal, fed dry, and lot 2 a meal ration of bran and gluten feed, fed wet. These rations were continued for 14 days, when the rations were interchanged between the lots of cows. The results from equally good rations should with such an interchange of rations have been quite similar. The results show a considerable difference however. As a study of the following tables will show, the ration fed wet gave a daily aggregate of 114 pounds milk testing 3·83 per cent butter fat, equivalent to 4·365 pounds butter fat, while the same cows, fed on the dry ration, gave 116½ pounds milk, testing 3·99 per cent butter fat, equivalent to 4·627 pounds butter fat, an increase of 2½ pounds of milk, of ·16 per cent butter fat, and of ·262 pounds butter fat, an increase of 6 per cent in favour of dry feed.



1. Berkshire Sow (Imp.) 2. Tamworth Sow (Imp.) 3. Berkshire Boar (Imp.)
4. Large Black Boars (Imp.) 5. Large Black Sows (Imp.)

COW FEEDING EXPERIMENT.

Dry Barley, Oats and Oil Meal versus Bran and Gluten fed wet.

	Daily Ration.	Date.	Cows.																		Total for Day.		
			Julia.						Begonia.						Bell.								
			Morning.			Evening.			Morning.			Evening.			Morning.			Evening.					
			Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Average Fat	Butter Fat.
			Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs.	p. c.	Lbs.
Lot 1 Period 1.	Corn ensilage, 40 lbs.	Oct. 17	14½	3·4	·49	10½	3·4	·35	13¾	3.4	·45	10	4·0	·40	14½	3·4	·49	10½	3·8	·39	73½	3·56	2·57
	Clover hay 2 "	" 18	15	3·2	·48	10½	3·6	·37	12½	2.8	·35	10½	4·0	·42	15	3·8	·57	10	4·0	·40	73½	3·56	2·59
	Bran 4 "	" 19	15	3·4	·51	10½	4·0	·42	12½	3·1	·38	11	4·0	·44	15	3·6	·54	10	4·2	·42	74	3·71	2·71
	Oats 1 "	" 20	15	3·3	.49	10½	3·8	·39	12½	2·9	·36	10	4·1	·41	15½	4·0	·62	10	4·4	·44	73½	3·75	2·71
	Gluten 2 "	" 21	15	3·1	·46	10½	3·6	·37	12½	3·2	·40	10½	4 2	·44	15½	3·6	·55	10	4·5	·45	74	3·7	2·67
	Pumpkins 15 "	" 22	15	3·3	·49	10½	3·8	·39	12½	3·1	·38	10	3·9	·39	15½	3 7	·57	10	4·8	·48	73½	3·76	2·70
		" 23	15	3·2	·48	11	3·6	·39	12½	3·5	·43	10½	4·0	·42	15	3·1	·46	10½	4·1	·43	74½	3 58	2·61
	Total		104½	3·3	3·40	74	3·7	2·68	88½	3·1	2·75	72½	4·0	2·92	106	3·6	3·80	71	4·3	3·01	516½	3·59	18·56
Lot 1 Period 2.		Oct. 24	15	3·4	·51	11	4·0	·44	12½	3·3	·41	10½	4·2	·44	15½	3·8	·58	10½	4·4	·46	75	3·85	2·84
		" 25	15	3·2	·48	10½	4·0	·42	13	3·3	·42	10	4·1	·41	16	4·0	·64	10½	4·4	·46	75	3·83	2·83
		" 26	15	3·3	·49	10½	3·6	·37	13	3·2	·41	10	4·0	·40	15½	3·8	·58	10½	4·4	·46	74½	3·71	2·71
		" 27	15	3·2	·48	10	3·4	·34	13	2·8	·36	12	4·1	·49	15	3·7	·55	9	3·4	·30	74	3·43	2·52
	Corn ensilage, 40 lbs	" 28	15½	3·2	·49	10½	3·8	·39	13	3·2	·41	11½	3·6	·41	16	3·9	·62	9½	4·2	·39	76	3·65	2·71
	Clover hay 2 "	" 29	15	3·4	·51	10½	3·9	·41	13	2·9	·37	11	4·0	·44	15	3·2	·48	10½	5·0	·52	75	3·73	2·73
	Meal mixture { Barley, 3 lbs	" 30	15	3·4	·51	10½	4·1	·43	13	2·8	·36	10½	4·2	·44	15	3·5	·52	10½	4·6	·48	74½	3·76	2·74
	Meal mixture { Oats 4 "	" 31	15	3·6	·54	10½	3·9	·41	12½	3·4	·42	10½	4·4	·46	14½	3·8	·55	10½	3·7	·38	73½	3·8	2·76
	Meal mixture { Oil meal 2 "	Nov. 1	15	3·3	·49	10½	4·0	·42	13	3·4	·44	11½	4·3	·49	15	3·6	·54	10	3·9	·39	75	3·75	2·77
	Meal fed dry and all they would stand	" 2	15	3·4	·51	10½	3·8	·39	13	3·5	·45	11	4·2	·46	14½	3·8	·55	9½	4·4	·41	73½	3·85	2·77
		" 3	14½	3·4	·49	10½	3·6	·37	13	3·0	·39	11	4·2	·46	14½	4·0	·58	9½	4·2	·39	73	3·73	2·68
		" 4	14½	3·4	·49	10½	4·0	·42	13	3·5	·45	11½	4·0	·46	14½	4·2	·60	10	4·4	·44	74	3·91	2·86
		" 5	14½	3·4	·49	11	3 8	·41	13	3·1	·40	11	4·7	·51	14½	4·0	·58	10	4·2	·42	74	3·87	2·81
		" 6	14½	3·6	·52	11	3·4	·37	13	3·4	·44	11½	3·9	·44	15	3·8	·57	10½	3·8	·39	75½	3·66	2 73
	Total		208½	3·4	7·00	148	3·8	5·59	181	3·2	5·73	153½	4·1	6·31	210½	3·8	7·94	141	4·2	5·89	1,042½	3·69	38·46

COW FEEDING EXPERIMENT—*Concluded.*

Dry Barley, Oats and Oil Meal versus Bran and Gluten fed wet.

	Daily Ration.	Date.	Cows.																		Total for Day.		
			Bloom.						Della.						Florence.								
			Morning.			Evening.			Morning.			Evening.			Morning.			Evening.					
			Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Fat.	B. Fat	Milk.	Average Fat	Butter Fat.
			Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs	p. c.	Lbs	Lbs.	p. c.	Lbs.
Lot 1 Period 3.	Corn ensilage, 40 lbs. / Clover hay 2 " / Meal mixture (Gluten, 3 lbs. / Bran 5 ") / Meal fed wet and all they would stand	Nov. 7	14	3·3	·46	10	3·6	·36	12½	3·0	·37	11	3·4	·37	14½	4·0	·58	9½	4·0	·38	71½	3·71	2·52
		" 8	14½	3·4	·49	10½	3·8	·39	13	2·8	·36	10½	3·4	·35	14½	3·4	·49	10	4·0	·40	73	3·46	2·48
		" 9	14½	3·2	·46	10½	3·8	·39	13	3·0	·39	11	3·9	·42	14	3·6	·50	10	3·6	·36	73	3·51	2·52
		" 10	14	3·2	·44	10	3·8	·38	12	3·0	·36	11	4·0	·44	14	3·6	·50	9½	4·0	·38	70½	3·6	2·50
		" 11	14	3·2	·44	10	3·7	·37	12	3·0	·36	10	4·0	·40	13	3·2	·41	9	3·9	·35	68	3·5	2·33
		" 12	13½	3·1	·41	9½	3·8	·36	12½	3·0	·37	9½	4·0	·38	13	3·4	·44	9	4·3	·38	67	3·6	2·34
		" 13	13½	3·5	·48	9½	3·8	·36	12½	3·3	·41	10	3·8	·38	13	3·5	·45	10	4·4	·44	68½	3·71	2·52
		" 14	12½	3·4	·42	9	3·9	·35	12	3·2	·38	9	4·0	·36	11½	4·0	·46	9	4·0	·36	63	3·75	2·33
		" 15	13	3·4	·44	9	3·8	·34	12½	3·3	·41	9	4·0	·36	12½	4·0	·50	9	3·9	·35	65	3·73	2·40
		" 16	12½	3·3	·41	8½	3·6	·30	12	3·2	·38	9	3·8	·34	12½	3·9	·48	8	4·1	·32	62½	3·65	2·23
		" 17	12½	3·0	·37	7½	3·8	·28	12½	3·0	·37	9	3·7	·33	12½	3·6	·45	8	4·0	·32	62	3·51	2·12
		" 18	12	3·1	·37	8½	3·8	·32	12	3·2	·38	9½	3·6	·33	13	3·6	·46	8½	4·0	·34	63½	3·55	2·20
		" 19	12	3·0	·36	8½	3·6	·30	12½	3·1	·38	9	3·7	·33	12½	3·8	·47	8½	4·0	·34	63	3·53	2·18
		" 20	12	3·2	·38	8½	3·6	·30	12½	3·1	·38	9	3·7	·33	12	3·7	·44	8½	4·0	·34	62½	3·55	2·17
	Total		184½	3·2	5·93	129½	3·7	4·80	173½	3·1	5·30	136½	3·8	5·12	182½	3·7	6 63	126½	4·0	5·06	933	3·52	32·84
Lot 2 Period 1.	Corn ensilage, 40 lbs / Clover hay, 2 " / Bran, 3 " / Oats, " / Gluten, 1½ " / Pumpkins, 15 "	Oct. 17	10	3·6	·36	7	4·4	·30	10½	4·4	·46	8	4·8	·38	9½	3·6	·34	7	4·2	·29	52	4·16	2·13
		" 18	10	3·8	·38	7½	4·0	·30	10	4·3	·43	8	4·8	·38	10	4·0	·40	7½	4·6	·34	53	4·25	2·23
		" 19	10½	3·8	·39	7½	4·4	·33	10	4·4	·44	8	4·8	·38	10	3·8	·38	7½	4·6	·34	53½	4·3	2·26
		" 20	10	4·0	·40	7	4·0	·28	10	4·0	·40	8	5·0	·40	10	3·9	·39	7	4·4	·30	52	4·21	2·17
		" 21	10½	3·6	·37	6½	4·4	·28	10	4·3	·43	8	5·0	·40	10	4·0	·40	7	4·9	·34	52	4·37	2·22
		" 22	9	4·6	·41	6½	4·4	·28	10	4·4	·44	8	5·0	·40	10	4·2	·42	6½	4·8	·31	50	4·56	2·26
		" 23	9	3·8	·35	7	4·0	·28	10	4·3	·43	8	4·6	·36	9	4·0	·36	6½	4 6	·29	49½	4·21	2·07
	Total		69	3·8	2·66	49	4·2	2·05	70½	4·3	3·03	56	4·8	2·70	68½	3·9	2·69	49	4·6	2·21	362	4·23	15·34

| | | |

Cows.	Rations Fed.								
	7 days Ensilage, Bran, Oats, Gluten, Pumpkins, Clover Hay.			14 days Ensilage, Clover Hay, Bran, Gluten } fed wet.			14 days Ensilage, Clover Hay, Barley, Oats, Oil Meal } fed dry.		
	Average Milk per day.	Average per cent fat.	Average dy. yield butter fat.	Average Milk per day.	Average per cent fat	Average dy. yield butter fat.	Average Milk per day.	Average per cent fat.	Average dy. yield butter fat.
	lbs.		lbs.	lbs.		lbs.	lbs.		lbs.
Bloom	17	4·0	·68	15½	4·0	·608	10½	4·3	·452
Della	18	4·5	·81	18	4·4	·790	16½	4·8	·792
Florence	17	4·2	·71	15	4·3	·640	14	4·6	·644
Julia	25½	3·4	·86	22½	3·4	·765	26½	3·5	·900
Begonia	23	3·5	·81	22	3·3	·726	24	3·6	·864
Bell	25½	3·8	·97	22	3·8	.836	25	3·9	·975
Total	126	3·84	4·84	114	3·83	4·365	116½	3·99	4·627

DAIRY HERD MILK RECORDS.

That our Canadian dairy cattle are, on the whole, not as profitable as they could be made is well known. That they might and should be the most profitable medium of converting our coarse grains and forage into merchantable produce has long been proven. It is evident, therefore, that as dairymen we should all bend our every energy to the improvement of this condition of affairs.

To preach the doctrine of good dairy bulls has long been the laudable practice of institute workers and agricultural writers. The selection of the best cows goes hand in hand with this, and to determine which animals really are paying all expenses and leaving a profit, a fairly accurate record of the milk produced must be kept.

During the past year an effort has been made to reach a number of our dairymen and get them interested in the keeping of such records. A large number agreed to keep records, and were furnished with blank forms.

Of the value of keeping such a record of the dairy cow, the following opinions are quoted from a few co-operators in various parts of the Dominion.

Uxbridge, Ont. :—'I have been doing the work for 4 years past, and if I did not consider it was an advantage I would not favour continuing the practice. It enables me to cull out the unprofitable cows.'—Jos. E. Gould.

Carlton West, Ont. :—'I would advise all farmers who keep cows to keep a record and learn just what each one is doing for him.'—Edward Adams.

Parry Harbour.—'I have learned a great deal, although for years I have kept a record of every one of my heifers for the first two years. I would advise every farmer to keep a record of what his cows are doing.'—James S. Miller.

Chute a Blondeau.—'By keeping a record of my cows, I have learned a great deal as to the value of the different feeds for milk. I would say to one and all : Keep a record of the cows if you want to find out where your profit comes from.'—D. D. Gray.

St. Emile Junction, Que.—'I most certainly do not regret the few moments employed in this work, which has made me familiar with the powers and qualities of my individual cows.'—C. Bonin.

Halfway Brook, N.S.—'I have learnt to watch the effect of feed on the cows, and thus feed more intelligently. I have obtained a good idea of the value of individual cows. It is well worth the trouble.'—Wm. Hunt.

Kentville, N.S.—'I think this is a good thing if carried out, and no doubt will be a boon to many a farmer throughout the country.'—C. O. Allen.

Bridgetown, N.S.—'It is a very simple and effective means of discovering and proving both the value and capacity of each individual cow, and also the effect of feed. My present feeling in regard to the record is that it is invaluable to any farmer who wishes to make his dairy herd a profitable branch of farming.'—A. Owen Price.

Ledue, N.W.T.—'I am grateful to you for advancing the plan of weighing the milk. I have decided to make it a rule to keep a record of my cows, and would advise all farmers to do likewise. I find it very little extra trouble.'—Robert Duncan.

Penhold, N.W.T.—'I have learnt enough to want to learn more. I know now much more about my cows, and am learning all the time.'—E. Carswell.

Upper Sumas, B.C.—'I believe that the testing of the herd of cows is well worth the labour and time it takes.'—Orion Bowman.

Many letters of a similarly gratifying character have been received, expressing appreciation of the work in helping the dairymen to detect the 'boarder' of the herd, as one man graphically puts it.

It is hoped to extend the list of co-operators and to make the effort at improvement in this line more general. To this end we shall be pleased to send blank forms with full particulars to farmers and dairymen wishing to undertake the work.

MILK TESTING.

During the year the following samples were tested in the dairy at the experimental farm :—

Skim milk	11
Butter-milk	9
Cream	12
Milk	21

The dairyman also tested at the milk factory, L'Ange Gardien, Que., 251 samples of milk and one sample of skim milk, the expenses in connection with this latter work being defrayed by the factory at L'Ange Gardien.

STEER FEEDING EXPERIMENTS.

The experiments with steers during the winter 1900-1 have been along the line of determining the comparative economy (1) of feeding dehorned steers, loose as contrasted with feeding steers not dehorned, tied ; (2) of feeding steers loose, a large number in a box, as contrasted with few in a box ; (3) of feeding steer calves, yearlings, two-year olds, or three-year olds ; (4) of feeding steer calves a limited or growing ration as contrasted with a heavy or fattening ration.

In estimating the cost of feeding steers and calves, the following prices were charged, being the current Ottawa market values of the different materials during the season 1900-01 :—

	Per ton.
Roots, 6 cents per bushel, or	$ 2.00
Ensilage	2.00
Clover hay	6.00
Straw	3.00
Corn	18.00
Oats, pease, or barley	19.00
Bran	15.00
Shorts	16.00
Oil meal	32.00
Gluten meal	16.00
Skim milk, 15 cents per cwt.	3.00
Calf meal, Blatchford's	90.00

During the last two years no experiments have been conducted to gain any further information as to the comparative value of different feeds for the production of beef. The aim in feeding has been to apply information already gained in this line, both here and elsewhere, and investigation has been confined, as indicated above, to the determination of the influence of age and manner of stabling in economy of beef production.

To eliminate as far as possible the influence of individual character in determining the results, groups of nine animals have been used in most cases.

The feeds fed have been mangels, turnips, carrots, ensilage, clover hay, and straw for roughage ; while corn, oats, barley, bran, gluten meal, and oil meal have made up the concentrated or meal ration.

When taken off grass, the steers are fed a roughage ration consisting of turnips, ensilage and clover hay. The feeds are fed in the proportion of, 30 roots, 15 ensilage, 5 hay. The hay is fed long, the roots pulped and mixed with ensilage. The amount fed is measured by the appetite of the animals, care being taken to keep them keen on their feed. As long as good daily gains in weight are secured this ration is continued. As soon as any appreciable lessening in daily rate of increase is observed, a small addition of meal is made to the roughage ration. This change or addition it is found must be made about 5 weeks after stabling. Steers started off in this way do not make phenomenal gains at any time, but are never likely to go 'off feed.' Neither are they likely ever to make gains enough in the day to pay for their keep, save during short intervals, but they are quite likely to keep near the paying point continuously, and thus leave a chance of a profit.

PROFITS IN STEERS.

To say there are great opportunities for making money by feeding steers would be misleading. To condemn the production of beef as a losing business in eastern Canada would be unwise. The farmer with much rough feed and a scarcity of labour will find in well-bred steers a good market for his produce, roughage and grain, at current prices. In addition, the rich manure so plentifully produced is an *invaluable* and *indispensable* and an *imperative* requirement of successful farming in Canada.

The personal factor enters so strongly into the possibility of a profit beyond this that it is impossible to predict the result. The careful buyer and good seller makes a profit where the less business-like man would incur a loss. The studious feeder finds what form of concentrate is the cheapest according to its properties, and uses it ; the careless man uses the handiest or what on the face looks cheapest, while it really may

be the dearest. Every little point requires careful consideration. The keen, broad, business man will make a profit, or at least get good value for his feed. The narrow, niggardly feeder will just as surely sell his feed cheap and work for low wages.

GENERAL STATEMENT.

During the year, steers were fed off to the value of $5,510.18. The cost, November 15th, 1900, was $3,485.40. The increase in value was $2,024.78. The feed cost, at prices quoted above, $1,611.76. The gross cost to produce the beef was, therefore, $5,097.16.

This leaves a net profit of $413.02. The manure quite easily pays for the labour of attending the stock and the wear and tear.

The number of steers fed was 94. Of these, 12 were bought as calves. The net profit per steer was $4.39. This is 5 cents per steer less than last year. Among the steers purchased, however, were 2 which were unthrifty, and after feeding them 2 months it was found necessary to sell them at less than cost.

DIFFERENT AGES.

The experiments with calves, yearlings, two-year olds, and three-year olds are rather interesting, as showing the great advantage of feeding growing animals as contrasted with mature or old animals. The yearlings and two-year olds put on flesh at practically the same cost, while the calves were much more economical as meat producers, and the three-year olds much less economical. The finished product varied in value as follows :—

Calves, $4.50 per 100 lbs. at 1 year old.
Yearlings, $4.77 per 100 lbs., at 2 years old.
Two-year olds, $5 per 100 lbs., at 3 years old.
Three-year olds, $5.12½ per 100 lbs., at 4 years old.

While the cost to put on flesh was as follows :—

Calves, $3.24 per 100 lbs. gain.
Yearlings, $5.77 per 100 lbs. gain.
Two-year olds, $5.71 per 100 lbs. gain.
Three-year olds, $6.37 per 100 lbs. gain.

From a glance at the above, it might be concluded that on all save the calves a loss was incurred. The fact of the case, however, as shown in the records below is that on all there was a profit.

The profit on each lot save the first alone is due to the increased value of the flesh bought. The cost of the various lots being as follows :—

Calves, cost $2.75 per 100 lbs.
Yearlings, cost $3.38 per 100 lbs.
Two-year olds, cost $3.50 per 100 lbs.
Three-year olds, cost $4.25 per 100 lbs.

This shows an increase in value of 100 pounds live weight of flesh purchased in each case as follows :—

Calves, increased value of 100 lbs. by $1.75.
Yearlings, increased value of 100 lbs. by $1.39.
Two-year olds, increased value of 100 lbs. by $1.50.
Three-year olds, increased value of 100 lbs. by 87½ cents.

The apparent break in the gradation of increase of value in live weight is due to the fact of the yearlings being rather small to make profitable shippers, and so having to rank as 'butcher's cattle.'

The average cost to feed one steer in each case was as follows :—

Calf, cost to feed 203 days		$13.80
Yearling	"	18.20
Two-year old	"	18.96
Three-year old	"	22.82

Below are full particulars of each lot in the experiment of feeding at different ages.

CALVES.

Number of steers in lot	5
First weight, gross	1,852 lbs.
First weight, average	370 "
Finished weight, gross	3,903 "
Finished weight, average	780 "
Total gain in 196 days	2,051 "
Average gain per steer	412 "
Daily gain for lot, 5 steers	10·46 "
Daily gain per steer	2·09 "
Gross cost of feed	$ 66.60
Cost of 100 lbs. gain	3.24
Cost of steers, 1,852 lbs. at $2.75 per cwt	50.93
Total cost of beef, $50.93+$66.60	117.53
Value of 3,903 lbs. at $4.50 per cwt.	175.63
Profit on lot	58.10
Net profit per steer	11.62
Average cost price per steer	10.19
Average selling price per steer	35.12
Average increase in value	24.93
Average cost of feed per steer	13.32

YEARLINGS.

Number of steers in lot	9
First weight, gross	7,845 lbs.
First weight, average	873 "
Finished weight, gross	10,650 "
Finished weight, average	1,187 "
Total gain in 203 days	2,835 "
Average gain per steer	315 "
Daily gain for lot, 9 steers	13·96 "
Daily gain per steer	1·55 "
Gross cost of feed	$163 77
Cost of 100 lbs. gain	5 77
Cost of steers, 7,845 lbs. at $3.38 per cwt.	265 00
Total cost to produce beef, $265+$163.77	428 77
Sold 10,147 lbs. at $4.77 per cwt.	483 12
Profit on lot	54 35
Net profit per steer	6 04
Average cost price per steer	29 44
Average selling price per steer	53 68
Average increase in value	24 24
Average cost of feed per steer	18 20

TWO-YEAR OLDS.

Number of steers in lot	9	
First weight, gross	8,730	lbs.
First weight, average	970	"
Finished weight, gross	11,720	"
Finished weight, average	1,302	"
Total gain in 203 days	2,990	"
Average gain per steer	332	"
Daily gain for lot, 9 steers	14·23	"
Daily gain per steer	1·58	"
Gross cost of feed	$170	70
Cost of 100 pounds gain	5	71
Cost of steers, 9 at $34	306	00
Total cost to produce beef, $306+$170.71	476	70
Sold 11,134 pounds at $5 per cwt.	556	70
Profit on lot	80	00
Net profit per steer	8	88
Average cost price per steer	34	00
Average selling price per steer	61	85
Average increase in value	27	85
Average cost of feed per steer	18	96

THREE-YEAR OLDS.

Number of steers in lot	9	
First weight, gross	10,950	lbs.
First weight, average	1,217	"
Finished weight, gross	14,175	"
Finished weight, average	1,575	"
Total gain in 203 days	3,225	"
Average gain per steer	358	"
Daily gain for lot, 9 steers	15·88	"
Daily gain per steer	1·76	"
Gross cost of feed	$205	41
Cost of 100 lbs. gain	6	37
Cost of steers, 10,403 lbs. at $4.25 per cwt.	437	13
Total cost to produce beef, $437.17+$205.41	642	58
Sold, 13,467 lbs. at $5.12½ per cwt.	690	21
Profit on lot	47	63
Net profit per steer	5	29
Average cost price per steer	48	57
Average selling price per steer	76	69
Average increase in value	28	12
Average cost of feed per steer	22	82

TIED VERSUS LOOSE.

As it is impossible to speak positively from one experiment along any given line, it was decided to continue the Tied *versus* Loose feeding test for several years.

In the record of the experiments conducted along this line last year, as shown in the report for 1900, page 75, the steers fed tied did better than those fed loose. This year the results show a margin in favour of the steers fed loose as contrasted with a similar lot fed tied. The steers in the various experiments were sold to go

June 3, 1901. Up till May the records of the two lots showed a margin in favour of the tied steers, but from that date till the shipping day, June 3, the loose steers kept gaining on the tied steers, till they stood, as indicated in the records which follow :—

Not Dehorned, Tied (3 years old.)

Number of steers in lot	9
First weight, gross	10,171 lbs.
First weight, average	1,130 "
Finished weight, gross	13,285 "
Finished weight, average	1,476 "
Total gain in 203 days	3,114 "
Average gain per steer	346 "
Daily gain for lot of 9 steers	15·34 "
Daily gain per steer	1·70 "
Gross cost of feed	$205 41
Cost of 100 pounds gain	6 60
Cost of steers, 9,663 pounds at $4.25 per cwt.	410 68
Total cost to produce beef, $410.68+$205.41	616 09
Sold, 12,621 pounds at $5.12½ per cwt.	646 20
Profit on lot	30 11
Net profit per steer	3 34
Average cost per steer	45 63
Average selling price per steer	71 80
Average increase in value	26 17
Average cost of feed per steer	22 82

Dehorned, Loose (3-year olds).

Number of steers in lot	9
First weight, gross	10,583 lbs.
First weight, average	1,175 "
Finished weight, gross	13,845 "
Finished weight, average	1,538 "
Total gain in 203 days	3,262 "
Average gain per steer	363 "
Daily gain of lot of 9 steers	16·07 "
Daily gain per steer	1·78 "
Gross cost of feed	$213 74
Cost of 100 pounds gain	6 55
Cost of steers, 10,054 pounds at $4.25 per cwt.	427 29
Total cost to produce beef, $427.29+$213.74	641 03
Sold, 13,153 pounds at $5.12½ per cwt.	674 09
Profit on lot	33 06
Net profit per steer	3 67
Average cost price per steer	47 47
Average selling price per steer	74 90
Average increase in value	27 43
Average cost of feed per steer	23 75

LARGE *versus* SMALL LOTS, LOOSE.

As indicated in last year's report, an experiment to gain some information as to the advisability of feeding few or many steers together, loose, has been tried. The data obtained from this experiment would indicate that 6 was the most suitable num-

ber to feed loose together, but a study of the individuals composing the different lots seemed to show that the character of the separate steers, as good or bad feeders, was an important factor in determining the final standing.

The fact of a steer being a 'good feeder,' or a 'bad feeder,' frequently affects very seriously the accuracy of the results. The buyer can in selecting feeders usually reject such as are likely to be 'bad doers,' or 'bad feeders.' It is, however, not always possible to single out the prospective, bad feeder, and rather poor doers are not always possible of detection. The difficulty is further increased when it comes to the question of selecting a large number of steers which shall make equal gains under similar treatment.

When a large number of animals is used in each lot, the individuality of the animals is in a measure overcome, and the larger the number, the less allowance is necessary for extra good or rather poor animals. Therefore, where differences in the number of animals fed together are the main feature of the experiment, it is quite evident that individual quality must be of more importance in the small lots than in the large.

Considering the above, the experiment may not be of any great value, but the subtended results are given for what they are worth :—

Dehorned, Loose (3-year olds.)

Number of steers in lot	9
First weight, gross	10,583 lbs.
First weight, average	1,175 "
Finished weight, gross	13,845 "
Finished weight, average	1,538 "
Total gain in 203 days	3,262 "
Average gain per steer	363 "
Daily gain for lot of 9 steers	16·07 "
Daily average per steer	1·78 "
Gross cost of feed	$213 74
Cost of 100 pounds gain	6 55
Cost of steers, 10,054 lbs. at $4.25 per cwt.	427 29
Total cost to produce beef, $427.29+$213.74	641 03
Sold, 13,153 lbs. at $5.12½ per cwt.	674 09
Profit on lot	33 06
Net profit per steer	3 67
Average cost price per steer	47 47
Average selling price per steer	74 90
Average increase in value	27 43
Average cost of feed per steer	23 75

Dehorned, Loose (3-year olds.)

Number of steers in lot	6
First weight, gross	6,593 lbs.
First weight, average	1,099 "
Finished weight, gross	8,770 "
Finished weight, average	1,461 "
Total gain in 203 days	2,177 "
Average gain per steer	363 "
Daily gain for lot of 6 steers	10·72 "
Daily gain per steer	1·79 "

Dehorned, Loose (3-year olds)—Concluded.

Gross cost of feed	$136 09
Cost of 100 pounds gain	6 25
Cost of steers, 6,264 pounds at $4.25 per cwt.	266 22
Total cost to produce beef, $266.22+$136.09	402 31
Sold, 8,332 pounds at $5.12½ per cwt.	427 01
Profit on lot	24 70
Net profit per steer	4 11
Average cost price per steer	44 37
Average selling price per steer	71 16
Average increase in value	26 79
Average cost of feed per steer	22 68

Dehorned, Loose (3-year olds.)

Number of steers in lot	3
First weight, gross	3,430 lbs.
First weight, average	1,143 "
Finished weight, gross	4,470 "
Finished weight, average	1,490 "
Total gain in 203 days	1,040 "
Average gain per steer	346 "
Daily gain for lot of 3 steers	5·12 "
Daily gain per steer	1·70

Gross cost of feed	$ 70 30
Cost of 100 pounds gain	6 76
Cost of steers, 3,259 pounds at $4.25 per cwt.	138 51
Total cost to produce beef, $138.51+$70.30	208.81
Sold, 4,247 lbs. at $5.12½ per cwt.	217 66
Profit on lot	8 85
Net profit per steer	2 95
Average cost price per steer	46 17
Average selling price per steer	72 55
Average increase in value	26 38
Average cost of feed per steer	23 43

STEER CALF EXPERIMENTS.

The experiment started last year with 10 steer calves has been continued, and below is a detailed statement of the feed, gains, and cost for the year.

The experiment is being repeated, and 10 steer calves have again been selected and started out. The rations have not been exactly similar with those of 1900, but the variation is small.

No comment on, or close study of these experiments will be made till several series have been completed. The data submitted will speak for themselves.

The aim is to determine the comparative economy of feeding calves a full fattening ration from the start as contrasted with a limited growing ration.

May Calves, *1901.*

EXPERIMENT II, CALVES—FULL FATTENING RATION.

Week ending	Milk.	Oats.	Corn.	Oil Meal.	Calf Meal.	Bran.	Shorts.	Pease.	Roots.	Ensilage.	Straw.	Hay.
May 25	245	17½	4	4	4	17½	.....	.....	.....	.....	.....	.....
June 1	350	17½	4	4	4	17½	.....	.....	.....	.....	.....	.....
" 8	350	17½	4	4	4	17½	.....	.....	.....	.....	.....	.....
" 15	350	17½	6 9/16	6 9/16	6 9/16	17½	.....	.....	.....	.....	.....	17½
" 22	350	17½	6 9/16	6 9/16	6 9/16	17½	.....	.....	.....	.....	.....	17½
" 29	350	17½	6 9/16	6 9/16	6 9/16	17½	.....	.....	.....	.....	.....	17½
July 6	350	17½	6 9/16	6 9/16	6 9/16	17½	.....	.....	.....	.....	.....	17½
" 13	525	17½	6 9/16	6 9/16	6 9/16	17½	17½	.....	.....	.....	.....	17½
	2,870	140	46	46	46	140	17½	.....	.....	.....	.....	88
July 20	525	17½	6 9/16	6 9/16	.....	17½	17½	.....	.....	.....	.....	17½
" 27	525	17½	6 9/16	6 9/16	.....	17½	17½	.....	.....	.....	.....	17½
Aug. 3	525	17½	17½	6 9/16	.....	17½	.....	.....	.....	35	.....	35
" 10	525	17½	17½	6 9/16	.....	17½	.....	.....	.....	35	.....	35
" 17	525	17½	17½	6 9/16	....	17½	.....	.....	.....	35	.....	35
" 24	525	35	35	17½	.....	17½	.....	.....	.....	105	.....	35
" 31	525	35	35	17½	.....	17½	.....	.....	.....	105	.....	35
Sept. 7	525	35	35	17½	.....	17½	.....	.....	.....	105	.....	35
	4,200	192	171	85	.....	140	35	.....	.....	420	.....	245

EXPERIMENT II, CALVES—FULL FATTENING RATION.

Week ending	Milk.	Oats.	Corn.	Oil Meal.	Bran.	Ensilage.	Hay.	Roots.
September 14	525	35	35	17½	17½	105	35	.....
" 21	525	35	35	17½	17½	105	35	.....
" 28	525	35	35	17½	17½	105	35	.....
October 5	.....	35	35	17½	17½	140	35	.....
" 12	.....	35	35	17½	17½	175	35	.....
" 19	.....	35	35	17½	17½	175	35	.....
" 26	.....	35	35	17½	35	350	35	.....
November 2	.....	35	35	17½	35	525	35	.....
" 9	.....	35	52½	17½	35	700	35	175
" 16	.....	35	52½	17½	35	700	35	175
" 23	.....	35	52½	17½	35	875	35	175
" 30	.....	35	52½	17½	35	875	35	175
	1,575	420	490	210	315	4,830	420	700

EXPERIMENT II, CALVES—LIMITED GROWING RATION.

Week ending	Milk.	Oats.	Corn.	Oil Meal.	Barley.	Bran.	Shorts.	Pease.	Roots.	Ensilage.	Straw.	Hay.
May 25	175	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
June 1	175	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
" 8	175	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
" 15	245	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
" 22	350	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
" 29	350	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
July 6	525	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
" 13	525	17½	.....	4	.....	17½	.....	.....	.....	.....	.....	17½
	2,520	140	.....	35	.....	140	.....	.....	.....	.....	.....	140
July 20	525	17½	.....	4	.....	17½	17½	.....	.....	.....	.....	17½
" 27	525	17½	.....	4	.....	17½	17½	.....	.....	.....	.....	17½
Aug. 3	525	17½	.....	4	.....	17½	17½	.....	.....	35	.....	35
" 10	525	17½	.....	4	.....	17½	17½	.....	.....	35	.....	35
" 17	525	17½	.....	4	.....	17½	17½	.....	.....	35	.....	35
" 24	525	17½	.....	17½	.....	35	35	.....	.....	105	.....	35
" 31	525	17½	.....	17½	.....	35	35	.....	.....	105	.....	35
Sept. 7	525	17½	.....	17½	.....	35	35	.....	.....	105	.....	35
	4,200	140	.....	74	.....	192	192	.....	.....	420	.....	245

Week ending	Milk.	Oats.	Barley.	Bran.	Shorts.	En-silage.	Hay.	Roots.
September 14	525	17½	17½	35	35	105	35	.....
" 21	525	17½	17½	35	35	105	35	.....
" 28	525	17½	17½	35	35	105	35	.....
October 5	.....	17½	17½	35	35	175	35	.....
" 12	.....	17½	17½	35	35	175	35	.....
" 19	.....	17½	17½	35	35	350	35	.....
" 26	.....	17½	17½	35	35	525	35	.....
November 2	.....	17½	17½	35	.....	700	35	.....
" 9	.....	17½	.....	35	.....	700	35	175
" 16	.....	17½	.....	35	.....	875	35	175
" 23	.....	17½	.....	17½	.....	875	70	350
" 30	.....	17½	.....	17½	.....	875	70	350
	1,575	210	110	385	245	5,565	490	1,050

EXPERIMENT II., CALVES—SUMMARY—LOT II. FULL FATTENING RATION.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 pound Gain.	Cost to Feed 1 Steer 1 day.	Weight at beginning of period.	Remarks.
	Lbs.	Lbs.	$ cts.	Cts.	Cts.	Lbs.	
1st of 8 weeks	582	2·08	9 60	1·65	3·43	463	May 29.
2nd of 8 weeks	515	1·84	13 32	2·58	4·94	1,050	
3rd of 12 weeks	650	1·55	22 78	3·50	5·42	1,565	
Average or aggregate	1,747	1·92	45 70	2·60	5·02	2,215	Final weight.

EXPERIMENT II., CALVES—SUMMARY—LOT I. LIMITED GROWING RATION.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 pound Gain.	Cost to Feed 1 Steer 1 day.	Weight at beginning of period.	Remarks.
	Lbs.	Lbs.	$ cts.	Cts.	Cts.	Lbs.	
1st 8 weeks	530	1·89	7 14	1·35	2·55	475	
2nd 8 weeks	530	1·89	12 95	2·44	4·62	1,005	
3rd 12 weeks	491	1·17	18 61	3·79	4·43	1,535	
Average or aggregate	1,551	1·68	38 70	2·49	3·95	2,026	Final weight.

Calves, May, 1900.

EXPERIMENT I—LIMITED GROWING RATION.

Period Week ending	Oats.	Barley.	Bran.	Shorts.	Roots.	Ensilage.	Hay.	Straw.
December 8	35	17½	35	17½	175	140	35	
" 15	35	17½	35	17½	315	280	35	
" 22	35	17½	35	17½	350	315	35	
" 29	35		17½	17½	490	455	35	
January 5	17½		17½	17½	525	525	35	
" 12	17½		17½		350	525	35	
" 19	17½				875	525	35	
" 26					700	700	35	35
	192½	52½	157½	87½	3,780	3,465	280	35

Period Week ending	Roots.	Ensilage.	Straw.	Hay.
February 2	875	700	35	35
" 9	700	700	35	35
" 16	700	700	35	35
" 23	875	875	35	35
March 2	875	875	35	35
" 9	875	875	35	35
" 16	525	1,225	35	35
" 23	525	1,225	35	35
	5,950	7,175	280	280

LIMITED GROWING RATION.

Period Week ending	Roots.	Ensilage.	Straw.	Hay.
March 30	525	1,225	35	35
April 6	525	1,225	35	35
" 13		1,400	35	35
" 20		1,400	35	35
" 27	350	1,225	35	35
May 4	350	1,225	35	35
" 8	150	525	35	35
	1,900	8,225	245	245

Period Week ending	Roots.	Ensilage.	Hay.	Pasture.
November 16.	.....	.....	.....	30 mos.
" 23.	350	1,225	70	.....
" 30.	350	1,225	70	.....
	700	2,450	140	30 mos.

EX PERIMENT I—FULL FATTENING RATION.

Week ending	Oats.	Corn.	Oil Meal.	Bran.	Gluten.	Roots.	Ensilage.	Hay.
Dec. 8.	35	.....	35	35	.....	105	140	35
" 15.	35	35	.....	35	.....	210	175	35
" 22.	35	35	.....	35	.....	315	280	35
" 29.	35	35	17½	35	.....	455	420	35
1901.								
Jan. 5.	35	35	17½	35	.....	490	420	35
" 12.	35	35	17½	35	.....	490	455	35
" 19.	35	35	17½	17½	.....	700	630	35
" 26.	35	35	17½	17½	.....	700	630	35
	280	245	122½	245	.....	3,465	3,150	280

FULL FATTENING RATION.

Week ending	Oats.	Corn.	Oil Meal.	Bran.	Gluten.	Roots.	Ensilage.	Straw.	Hay.
Feb. 2.	52½	35	17½	17½	.....	700	630	35	35
" 9.	52½	35	17½	17½	.....	700	630	35	35
" 16.	52½	35	17½	17½	.....	700	700	35	35
" 23.	17½	.....	17½	17½	35	700	875	35	35
Mar. 2.	17½	.....	17½	35	35	700	875	35	35
" 9.	17½	.....	17½	35	35	700	875	35	35
" 16.	17½	.....	17½	35	35	700	875	35	35
" 23.	17½	.....	17½	35	35	700	875	35	35
	245	105	140	210	175	3,500	6,335	280	280

FULL FATTENING RATION.

Week ending	Oats.	Gluten.	Oil Meal.	Bran.	Roots.	Ensilage.	Straw.	Hay.
March 31.	17½	35	17½	35	700	875	35	35
April 6.	17½	35	17½	35	700	875	35	35
" 3.	35	35	17½	35	700	875	35	35
" 20.	35	52½	17½	35	700	875	35	35
" 27.	35	52½	35	35	525	1,050	35	35
May 4.	35	52½	35	35	525	1,050	35	35
" 11.	35	52½	35	35	525	1,050	35	35
" 18.	35	52½	35	35	.....	1,225	35	35
	245	367½	210	280	4,375	7,875	280	280

FULL FATTENING RATION.

Week ending	Oats.	Corn.	Oil Meal.	Bran.	Ensilage.	Straw.	Hay.	Green Feed.
May 25	35	70	35	35	1,225	35	35	
June 1	35	70	35	35	1,225	35	25	
" 8	35	70	35	35	1,225	.....	70	
" 15	35	70	35	35	1,225	.....	105	
" 22	35	70	35	35	1,225	.....	105	
" 29	35	70	35	35	1,225	.....	105	
July 6	35	70	35	35	1,225	.....	35	Pasture.
" 13	35	70	35	35	1,225	.....	35	Pasture.
	280	560	280	280	9,800	70	525	

FULL FATTENING RATION.

Week ending	Oats.	Corn.	Oil Meal.	Bran.	Ensilage.	Hay.	Green Feed.	Gluten.	Roots.
July 20	52½	70	35	35	1,050	35	Pasture at night on a small lot, 1 acre.		Pasture on one acre lot for six weeks.
" 27	52½	70	35	35	1,700	35			
August 3	52½	70	35	35	525	35			
" 10	52½	70	35	35	525	35			
" 17	52½	70	35	35	525	35			
" 24	70	105	35	35	525	35			
" 31	70	105	35	35	525	35			
September 7	70	105	35	35	525	35			
" 14	70	105	35	35	525	70			
" 21	70	105	35	35	525	70			
" 28	70	105	35	35	525	70			
October 5	70	105	35	35	525	70			
" 12	70	105	35	35	700	70			
" 19	70	.....	35	35	700	70	.....	122½	
" 26	70	.....	52½	35	1,050	70	.....	122½	
November 2	70	.....	52½	35	1,050	70	.....	122½	175
" 9	70	.....	52½	35	1,050	70	.....	122½	350
" 16	70	.....	52½	35	1,225	70	.....	122½	350
" 23	70	.....	52½	35	1,225	70	.....	122½	350
" 30	70	.....	52½	35	1,225	70	.....	122½	525
	1,202½	1,190	805	700	15,125	1,120	.....	857½	1,750

EXPERIMENT I—SUMMARY FOR 1901—LOT I. LIMITED GROWING RATION.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 pound Gain.	Cost to Feed 1 Steer 1 day.	Weight at beginning of Period.
	Lbs.	Lbs.	$ cts.	Cents.	Cents.	Lbs.
1st, 8 weeks	325	1·16	12 37	3·80	4·42	1,885
2nd, 8 "	295	1·05	14 38	4·87	5·14	2,210
3rd, 7 "	120	0·45	11 22	9·35	4·58	2,505
4th, 6 months	1,210	1·10	30 00	2·48	3·33	2,625
5th, 2 weeks	140	2·00	3 57	2·55	4·00	3,835
Statement for year	2,090	1·14	71 54	3·42	3·92	3,975*

* Weight, November 30, 1901.

EXPERIMENT I.—SUMMARY FOR 1901—LOT II. FULL FATTENING RATION.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 pound Gain.	Cost to Feed 1 Steer 1 day.	Weight at beginning of Period.
	Lbs.	Lbs.	$ cts.	Cents.	Cents.	Lbs.
1st, 8 weeks..... ...	660	2·35	16 10	2·44	5·75	2,165
2nd, 8 "	609	2·17	19 40	3·14	6·92	2,825
3rd, 8 "	469	1·67	24 25	5·17	8·66	3,434
4th, 8 "	467	1·67	27 75	5·94	9·91	3,903
5th, 8 "	320	1·14	24 75	7·73	8·84	4,370
6th, 12 "	935	2·22	45 60	4·87	10·85	4,690
Statement for year.	3,460	1·9	157 75	4·55	8·53	5,625*

*Weight November 30, 1901.

SHEEP.

The breeding flocks include the following animals of the Shropshire and Leicester breeds :—

Shropshires :—

1 ram (imp.), 18 months old.
1 ram lamb, 6 months old.
2 ewes (imp., 1899), 2½ years old.
2 ewes, 2½ years old.
5 ewes (imp.. 1901), 1½ years old.
4 ewe lambs (imp., 1901), 8 months old.
3 ewe lambs, home bred, 6 months old.

Leicesters :—

1 ram lamb, 'Stanisson,' 8 months old.
1 ewe, 5½ years old.
3 ewes, 4½ years old.
2 ewes, 2½ years old.
2 ewes, 1½ years old.
2 ewe lambs, 6 months old.

Besides the above, there are three grades which are being experimented upon for breeding purposes.

The lamb crop the past spring was not so good as that for 1900, but the lambs have done much better during the past summer, and a number of good animals have been sold or retained for breeding purposes.

Several of the best Shropshire flocks in Great Britain were visited during the summer. At Mr. Minton's annual ram sale one of the top shearling rams was secured.

From the famous flock of Mr. Mansell were secured 5 shearling ewes and 4 ewe lambs. These, it is hoped, may constitute the foundation of a good flock.

The Leicester ram, Stanisson, was secured from Mr. A. W. Smith, Maple Lodge, Ont. He was a winner at the Pan-American Exposition, Buffalo, this year.

As in preceding years, the sheep were pastured on a small, stony field. This was supplemented by rape and some clover.

RAPE FOR SHEEP.

The use of rape as a pasture for sheep and lambs cannot be too highly commended. There are, however, two or three dangers to be guarded against. In the first place, care must be taken that the sheep do not enter the rape when very hungry, especially is there danger in this when the leaves are for any reason wet. The effect to be feared is 'bloating.'

Rape is, as indicated in the report for 1900, very rich in protein, much richer than most other forage plants, as the proportion of protein to carbo-hydrates is about 1 to 1:8. This is much too great a proportion of protein, and where sheep, or more particularly, lambs are confined to this feed they soon show signs of some injurious influence at work. A sleepiness is first observed, which later is followed by a weakness of the limbs and the sudden falling of the animal. It is, then, very difficult indeed to put them in good condition again. Of course, it is easy to avoid this trouble by letting the lambs have another pasture part of the day. For such a purpose a hill pasture or some pasture carrying but little clover is to be preferred.

SWINE.

There are on the farm at present four herds of pure-bred swine. They are made up as follows :—

Berkshires :—

1 boar (imp., 1901), 8 months old.
1 boar, 'Bobby,' 6 months old.
1 sow (imp., 1901), 1 year old.
2 sows, 1½ years old.

Large Improved Yorkshires :—

1 boar, 1½ years old.
5 sows, 1½ to 3 years old.
1 sow (imp., 1901), 1 year old.
1 sow, 9 months old.

Tamworths :—

1 boar, 'Hero,' 15 months old.
2 sows, 2 years old.
1 sow (imp., 1901), 1 year old.

Large Blacks :—

2 boars (imp., 1901), 6 months old.
2 sows (imp., 1901), 6 months old.

The imported pigs were secured from the most famous herds in England. The Yorkshire sow came from Sanders Spencer, Esq., St. Ives, Hunts ; the Berkshires, from Philo L. Mills, Esq., Ruddington Manor, Notts ; the Tamworth, from D. W. Phillips, Esq., The Ashes, Whiteacre, Birmingham.

The large Blacks seem to be slowly coming into prominence in England. The individuals are of the bacon type, but rather coarse. Some experimental work will be done with them here to test their value as an addition to our bacon breeds. An effort will be made to determine their value for crossing with some of the other breeds of pigs.

The breeding pigs during the past year have done only fairly well. The spring litters were rather late, which, of course, influenced the date of the fall litters.

During the season about 40 pigs have been sold for breeding purposes, and the rest of the young pigs sold for pork.

PORK PRODUCTION.

A large number of pigs have been fed during the year, but particular reports can be given of 4 lots only.

In each case the meal mixture fed consisted of one-half corn, the other half oats, pease and barley, equal parts. In addition, each pig was given 3 lbs. of milk daily and all the roots they would consume, as follows :—

Lot 1.—Turnips fed pulped.
Lot 2.—Mangels fed pulped.
Lot 3.—Sugar beets grown for forage fed pulped.
Lot 4.—Sugar beets grown for sugar production fed pulped.

Lot 1.—Meal, Milk, Turnips.

Number of pigs in test	4	
Aggregate weight, January 7	405	lbs.
Average weight January 7	101	"
Aggregate weight April 23	768	"
Average weight April 23	192	"
Aggregate gain	363	"
Average gain	91	"
Daily rate of gain per pig for 106 days	·85	"
Pigs ate 780 lbs. meal at 90 cents per cwt.	$ 7	02
" 3,803 lbs. mangels at 10 cents per cwt.	3	81
" 1,284 lbs. skim milk at 20 cents per cwt.	2	57
Total	$13	40

Cost to produce pork was :—

405 lbs. feeders at $7 per cwt.	$28	35
Food consumed	13	40
Total cost	$41	75
Sold 768 lbs. pork at $6 per cwt.	$46	08
Profit on lot of 4 pigs	4	33
Cost to produce 100 lbs. increase live weight	3	69

Buyer's report :—

4 pigs, all 'select.'

Packer's report on carcasses :—

No. 312 weighed alive 197 lbs. ; dressed, 133 lbs. ; graded, 'good, firm.'
No. 313 weighed alive 197 lbs. ; dressed, 135 lbs. ; graded, 'hard, firm.'
No. 314 weighed alive 189 lbs. ; dressed, 126 lbs. ; graded, 'hard, firm.'
No. 315 weighed alive 185 lbs. ; dressed, 121 lbs. ; graded, 'good, firm.'

Lot 2.—Meal, Milk, Mangels.

Number of pigs in test	4	
Aggregate weight January 7	377	lbs.
Average weight January 7	94	"
Aggregate weight April 23	766	"
Average weight April 23	191	"
Aggregate gain	389	"
Average gain	97	"
Daily rate of gain per pig, 106 days	·90	"

Pigs ate 786 lbs. meal at 90 cents per cwt.	$ 7 07
" 5,930 lbs. mangels at 10 cents per cwt.	5 93
" 1,284 lbs. skim milk at 20 cents per cwt.	2 07
Total	$15 57

Cost to produce pork was :—

377 lbs. feeders at $7 per cwt.	$26 39
Food consumed	15 57
Total cost	$41 96
Sold 766 lbs. pork at $6 per cwt.	$45 96
Profit on lot of 4 pigs	4 00
Cost to produce 100 lbs. increase live weight	4 00

Buyer's report :—

4 pigs, all 'select.'

Packer's report on carcasses :—

No. 319 weighed alive 195 lbs. ; dressed, 135 lbs. ; graded, 'good, firm.'
No. 317 weighed alive 195 lbs. ; dressed, 138 lbs. ; graded, 'good, firm.'
No. 318 weighed alive 182 lbs. ; dressed, 125 lbs. ; graded, 'good, firm.'
No. 319 weighed alive 194 lbs. ; dressed, 131 lbs. ; graded, 'good, firm.'

Lot 3.—Meal, Milk, Forage Sugar Beets.

Number of pigs in test	4
Aggregate weight January 7	307 lbs.
Average weight January 7	77 "
Aggregate weight April 23	807 "
Average weight April 23	202 "
Aggregate gain	500 "
Average gain	125 "
Daily rate of gain per pig, 106 days	1·18 "

Pigs ate 793 lbs. meal at 90 cents per cwt.	$ 7 13
" 4,298 lbs. sugar beets at 15 cents per cwt.	6 44
" 1,284 lbs. skim milk at 7 cents per cwt.	2 57
Total	$16 14

Cost to produce pork was :—

307 lbs. feeders at $7 per cwt.	$21 49
Food consumed	16 14
Total cost	$37 63
Sold 807 lbs. pork at $6 per cwt.	$48 42
Profit on lot of 4 pigs	10 79
Cost to produce 100 lbs. increase live weight	3 22

Buyer's report :—

3 pigs 'select,' 1 pig 'fat.'

Packer's report on carcasses :—

No. 320 weighed alive 175 lbs. ; dressed, 118 lbs. ; graded, 'medium, a little too thin.'

No. 321 weighed alive 218 lbs. ; dressed, 155 lbs. ; graded, 'very good, a little too fat.'

No. 322 weighed alive 187 lbs. ; dressed, 130 lbs. ; graded 'very fair.'

No. 323 weighed alive 227 lbs. ; dressed, 157 lbs. ; graded, 'very firm, right thickness of fat.'

Lot 4.—Meal, Milk, Sugar Beets (Special Culture.)

Number of pigs in test	4
Aggregate weight January 7	228 lbs.
Average weight January 7	57 "
Aggregate weight May 25	754 "
Average weight May 25	188 "
Aggregate gain	528 "
Average gain	132 "
Daily rate of gain per pig for 138 days	·95 "
Pigs ate 1,032 lbs. meal at 90 cents per cwt.	$ 9 29
" 4,266 lbs. sugar beets at 15 cents per cwt.	6 39
" 1,680 lbs. skim milk at 20 cents per cwt.	3 36
Total	$19 04
Cost to produce pork was :—	
228 lbs. feeders at $7 per cwt.	15 96
Food consumed	19 04
Total cost	$35 00
Sold 754 lbs. pork at $6 per cwt.	$45 24
Profit on lot of 4 pigs	10 24
Cost to produce 100 lbs. increase live weight	3 60

Buyer's report :—

4 pigs, all 'select.'

No packer's report on carcasses.

During the past three years a large number of pigs have been fed in this department to determine, if possible, the influences affecting that quality of pork commonly known as 'firmness.'

THE SOFT PORK PROBLEM.

The series of experiments were planned by Mr. F. T. Shutt, the chemist, and myself, and each carcase examined for firmness by one or both of us. For several reasons it could not, on the whole, be made an experiment in comparative economy of feeding for the various rations. A number of lots have been reported on in this respect, however, in the reports for 1899-1900, as well as in this year's report.

To give some idea of the scope of the experimental feeding carried on, I may say that the following influences were studied in their effect upon the quality of the finished product :—

1. Eastern or Ottawa district pigs as contrasted with western or St. Clair district pigs when fed similarly.

2. Pigs, outside in roomy lots, as contrasted with pigs in cramped quarters, under cover, fed similar rations.

3. Preparation of feed, as feeding similar lots similar feed, dry, soaked, or cooked, ground in each case.

4. Supply of feed, a limited, as contrasted with an unlimited supply of similar feed fed in a similar manner.

5. Feeding one kind of feed from beginning to end of experiment, as contrasted with feeding similar feed during first period, or up to 100 pounds live weight, then changing to a different feed, and the reverse of this.

6. Different feeds, oats, pease, barley, Indian corn, shorts, beans, skim milk, rape, clover pasture, steamed clover, mangels, turnips, sugar beets, pumpkins, artichokes.

These were fed separately or in mixtures of different proportions prepared as indicated above.

To neglect individual and group results (a full report of which may be found in Bulletin No. 38), I may say that the experiments seem to point to the following conclusions :—

1. Locality whence pigs come has apparently no influence on firmness.

2. Opportunity of exercise as afforded by a large run does not appear to materially affect firmness.

3. Neither cooked nor soaked feed has any superiority over dry feed as a producer of firm bacon.

4. Feeding a large rather than a limited or small ration is not likely to affect firmness.

5. Kind of feed determines the kind of bacon, health being good.

(*a*) Indian corn produces soft pork, unless fed in small quantities or with skim milk (or whey).

(*b*) The greater the proportion of Indian corn in the ration, the softer is the pork likely to be.

(*c*) Oats, pease and barley in equal parts make up an excellent ration for the production of firm pork.

(*d*) Skim milk is without a peer as part of any ration for the production of firm pork.

(*e*) Rape, pumpkins, artichokes, sugar beets, turnips, and mangels may be expected to have no injurious effects upon the firmness of the pork product when fed with an otherwise good ration.

6. General good health and thrift are important for the production of firm bacon. Skim milk added to any grain or succulent ration will add to the thrift of the animals. A fairly roomy yard, pen or run is conducive to good health and thrift.

SOIL CULTIVATION.

That our arable soils have undergone a great change since the first settlers stirred their fertile depths, I am sure the most conservative will admit ; that the change has been for the better only too few have any ground for asserting ; on the contrary, almost every farmer whose memory goes back twenty, or even ten years will agree that our crops to-day in any of the eastern provinces are not, as a rule, what they used to be, and the question naturally comes, why this falling off in returns, even from the fields of many of our best farmers ? It may be answered that the causes are various. Yet they seem to be included in the lack of one marked peculiarity of fertile lands—good physical condition. No matter how rich the area in the essentials of plant life, though every foot of the land be saturated with phosphates and potash and nitrates, yet, being in poor physical condition, the returns are sure to be low.

A bare definition of physical condition will indicate but imperfectly the reasons for the results claimed.

Physical condition may be said to mean the degree of friability or openness or crumbliness of a soil, its power to retain moisture, and its immediate water-content.

To show the importance attached to good physical condition by one of the most famous of agriculturists, let me quote from the works of the late Sir John Lawes, chief of the celebrated Rothamstead experiment station, who, after an experience of over 50 years in soil cultivation and fertilization, said : 'All our experiments tend to show that it is the physical condition, its capacity for absorbing and retaining water, its permeability to roots, and its capacity for absorbing and retaining heat that is of more importance than its chemical composition.'

Conditions of Plant Growth.—To discuss 'good physical conditions, it is necessary to consider for a few moments the requirements of the healthy, growing plant. They are : Light, air, moisture, heat and food. The lack of any one, or the superabundance of any one, means death to the plant. Their presence in too small or too large proportions means sickly plants.

Light, we cannot control, therefore it need not be discussed.

Air will, of course, always surround the stems and leaves of our crops, but it is just as necessary to the roots. Water-soaked, baked, or puddled soils do not permit any air to circulate among their particles. They are, therefore, not suited for plant occupation. It is to lack of air in such cases rather than superabundance of water or impermeability of the soil to roots that failure is due.

Moisture, or water is necessary as a solvent for much of the plant's food. It serves as a vehicle for carrying the food from the soil to the leaves of the plant. An abundance is absolutely indispensable, an over-supply is fatally injurious.

The heat necessary for seed germination and plant growth is a relative condition, and so dependent upon the other factors for its effectiveness as to need but little discussion at this point. That high temperatures with abundant moisture induce rank growth is well known to every farmer. To secure such a combination in our northern latitudes requires careful cultivation. It really depends on good physical condition.

Food is, of course, an important requirement in plant growth. Acting on the assumption that food is the all in all, the one great factor in plant life, many have followed this premise to its logical conclusion and supplied the plant with food in specially prepared forms in more or less homeopathic (relatively speaking) doses. Most soils contain immense quantities of plant food. It is not always in an available form. Adding to this supply in practically the same form will not guarantee good results. The following of a course likely to secure good physical conditions would insure an abundant supply of plant food in the form best suited for sustaining plant life by converting the erstwhile unavailable food into available forms.

Influences Affecting Physical Condition of Soils.

The influences affecting physical condition are various, and it cannot be hoped to discuss them at any length at the present moment. To name the more important conditions, without reference to their relative importance, they might be said to be :—

1. The character of the soil ; that is, whether a clay, a clayey loam, sandy loam, sand, gravel, muck or peaty and, generally speaking, whether of a drift or an alluvial formation.
2. The water-line or water-level of the area.
3. The condition of the soil at time of cultivation ; that is, whether wet or dry when last ploughed or cultivated.
4. The crop that has been grown the previous year.
5. The amount of humus in the soil and the character of the same.

Character of the Soil.—The character of the soil is, generally speaking, the factor most likely to affect the physical condition of a field where no special attention has been paid to improvement of this imperative condition of fertility. The more the farmer studies the influences affecting physical condition and attempts in the right way to improve the same, however, the less will he find to be the necessity for considering the kind of soil making up his fields.

In the case of well drained alluvial soils he can hardly make a miss did he try. Other soils, however, require more careful treatment, especially is this the case where the extremes, as they might be called—a heavy clay or a light sand—are to be considered. The intermediate soils demand less careful treatment and are very seldom injured by time or manner of cultivation.

The Water-line.—While once the water-level is 6 or 8 inches below the surface, it is quite possible to cultivate the fields, yet if success would be assured some way must be found to make the water-line at least 2 feet below the average soil surface level. Frequently, good crops may be grown where the water stands higher than this, but under average conditions it will be found profitable to so drain as to insure a root bed of at least twenty-four inches in depth. Roots will not penetrate below the water-line to any appreciable extent. The water-line is, therefore, the lower boundary of any farm or field. By how much lower this line, by so much more farm land for the owner may be said of it. True, the area of arable land is not changed, but the hunting ground of the root is extended, and this is, generally speaking, accompanied by a more vigorous, rank and rapid plant growth, there being, of course, so much more room for root development.

The condition of the soil at time of cultivation enters so materially into the success or failure of the whole year's operation that it is justly considered by many farmers the chief point, making for a good or bad crop. The heavy soil that shows a shining surface, glistening with moisture behind the plough, cannot be expected to give good returns from the next crop. The particles becoming compacted form into more or less large clods and all fertility contained in them is locked in the lump, not for one year merely, but for an indefinite period. The harm done by the simple operation cannot be undone save by years of patient, skilful toil.

As the gradation of soil goes towards the lighter or sandy forms less and less care need be given to its condition at time of cultivation, since there is less danger of the particles compacting.

The Previous Crop.—As a factor in the physical condition of a field at a given time, the previous crop on that field is usually of great importance. The turning down of a heavy sod makes a great difference in the physical condition of a field and in no kind of soil is the good effect more evident than heavy clay. The turning down of stubble is also beneficial, but not to the same extent.

The influence of fallow or partial fallow, as after corn, roots or potatoes, is also beneficial. The manure usually applied with such crops in addition to the cultivation puts the soil in a loose friable condition and a part of the plant food previously unavailable may after such crops be taken up by the plant.

Humus.—As an influence on the physical condition of a soil, humus is without a peer. As a factor in the improving of our soils it cannot be over-estimated. Its influence goes to render friable the heavy clay and to relieve it from the tendency to bake or harden. It has an opposite effect on light or sandy soils, the particles of which it causes to adhere and so make a firm root bed, the condition so often lacking in such soil, yet so essential to good results. The effect of humus on the water-content is to increase the amount of water possible of being held by a given volume of soil without doing injury to the plant root life therein. For this reason all dry soils are very greatly improved by humus, and for the same reason the humus should be retained

near the surface of the soil since that is the part most likely to suffer from evaporation.

In addition, while increasing the water holding power of a soil it increases the heat absorbing power and so promotes growth in that way ; heat and moisture, as stated above, making the best combination for rapid growth.

The continued cropping of our farm lands without an adequate return of farm-yard manure or the sufficient use of clover has resulted in the poor condition of many farms. The addition of humus to such so-called fertility depleted areas soon insures good crops and an apparent return of all the virgin richness.

Humus is decayed vegetable matter.—Farm-yard manure, clover roots, and green crops ploughed under are its most fruitful sources. Its place is near the surface. It can be kept there by surface cultivation.

ESTIMATING COST OF PRODUCTION.

The importance of determining cost of production of our grain and forage crops is scarcely questionable. The climatic, and soil factors must, however, always be of primary importance, and on that account all estimates must be more or less particular in their bearing rather than general.

In the estimates which are included in the following reports on the different crops, rent, manure, labour, material (seed, twine, &c.), and wear and tear are considered. The item of supervision, of considerable moment on such farms as this, has been omitted, since most farmers in Canada do much of their own work, as well as direct the labour of such men as they employ.

The digestibility of a feed is another factor which must enter materially into any consideration of its economy of production, since, as is well known, the digestibility of our feeding stuffs ranges from about 25 per cent of the dry matter to practically 100 per cent of the whole thing.

In dividing the cost of production of a grain crop between the straw and grain, however, where the digestible dry matter of the one part is so different in composition and value from that of the other, some additional standard is necessary. Since protein is that part of any ration the most expensive to supply, it was decided to make the digestible protein the basis of value. It is, of course, well understood that protein is not the only important constituent of straw. Frequently it is of very minor consideration indeed, as when used for litter, since about 29-30 of the whole dry matter is of equal or even greater value as absorbent material.

CROP ON THE 200 ACRE FARM

OATS.

Seven varieties of oats were grown ; they were Banner, Siberian, Tartar King, Waverly, Goldfinder, Scotch Potato and Improved Ligowo. They were sown on land that had been in roots or corn the preceding year. As the land was not of uniform character, the results will not indicate the comparative productivity of the different varieties.

The particulars of the lots sown are as follows :

Banner.—16 acres, sown May 4, 2 bushels per acre ; matured in 94 days, August 6. Yielded 45 bushels 2 pounds per acre. Measured bushel weighed 35 pounds.

Siberian.—8 acres, sown May 2, 1¾ bushels per acre ; matured in 91 days, August 1. Yielded 45 bushels 2 pounds per acre. Measured bushel weighed 31 pounds.

Waverly.—2 acres, sown May 1, 1¾ bushels per acre ; matured in 97 days, August 5. Yielded 47 bushels 8 pounds per acre. Measured bushels weighed 35¾ pounds.

Tartar King.—2 acres, sown May 1, 2 bushels per acre ; matured in 93 days, August 1. Yielded 47 bushels 1 pound per acre. Measured bushel weighed 36½ pounds.

Scotch Potato.—1 acre, sown May 1, 1¾ bushels per acre ; matured in 111 days, August 9. Yielded 44 bushels 19 pounds per acre. Measured bushel weighed 36 pounds.

Goldfinder.—1 acre, sown May 1, 2 bushels per acre ; matured in 111 days, August 9. Yielded 51 bushels 16 pounds per acre. Measured bushel weighed 34½ pounds.

Improved Ligowo.—5 acres, sown May 4, 1¾ bushels per acre ; matured in 88 days, July 31. Yielded 47 bushels per acre. Measured bushel weighed 37½ pounds.

Cost of growing 35 acres of oats—

Rent of land, at $3 per acre	$105 00
Cultivating and ribbing in autumn, 7½ days at $2.50	18 75
Cultivating and harrowing, 12 days at $2.50	30 00
⅓ manure, at the rate of 15 tons per acre, applied in root year, valued at $1 per ton	105 00
Seed, 66 bushels at 50 cents	33 00
Sowing, 3½ days at $2.50	8 75
Rolling, 2 days at $2.50	5 00
Cutting with binder, 3½ days at $2.50	8 75
Use of machinery	4 00
Twine	14 00
Shocking, 7 days at $1.25	8 75
Loading and unloading, 18 days at $1.25	22 50
Teams drawing, 6 days at $2.50	15 00
Threshing, 1,612 bushels at 2½ cents per bushel	40 30
	$418 80

Total yield, 54,815 pounds, or 1,612 bushels 7 pounds.

Average yield per acre, 1,566 pounds, or 46 bushels 2 pounds.

Total straw on 35 acres, 30 tons.

Cost to produce 1 bushel grain	22·7 cts.
Cost to produce 1 ton grain	$13 37
Cost to produce 1 ton straw	1 74
Cost to produce 100 pounds digestible dry matter, grain	107·3 cts.
Cost to produce 100 pounds digestible dry matter, straw	19·8 cts.

BARLEY.

Mensury.—5 acres were sown on what had been turnip land the preceding year. Sown May 4 ; matured in 79 days, July 22. Yielded 36 bushels 33 pounds per acre. Measured bushel weighed 48 pounds.

Cost of growing 5 acres of barley—

Rent of land, 5 acres at $3 per acre	$15 00
Ribbing in autumn, 1 day at $2.50	2 50
Cultivating in spring, twice, 1 4-10 days at $2.50	3 50
Harrowing, 3-10 day at $2.50	0 75
Manure, ⅕, at the rate of 15 tons per acre, at $1 per ton	15 00
Seed, 8¾ bushels at 50 cents	4 37½
Sowing, ½ day at $2.50 per day	1 25
Rolling, 3 hours at $2.50 per day	0 75
Cutting with binder, ½ day	1 25
Twine used, $2 ; use of machinery, $2	4 00
Shocking, 8-10 day at $1.25	1 00
Hauling, team 1 day, $2.50 ; men, 2 at $1.25	5 00
Threshing, 184 bushels at 3½ cents per bushel	6 44
	$60 81½

Total yield, 183 bushels, 21 pounds, or 8,784 pounds.

Average yield per acre, 36 bushels 33 pounds, or 1,757 pounds.

Total straw on 5 acres, 4 tons.

Cost to produce 1 bushel grain	33·1 cts.
Cost to produce 1 ton grain	$13 84
Cost to produce 1 ton straw	1 70
Cost to produce 100 lbs. digestible dry matter, grain	90·3 cts.
Cost to produce 100 lbs. digestible dry matter, straw	18·7 cts.

PEASE.

Blue Prussian.—5 acres. This crop was grown on land that had been pastured the previous year. It had been broken up early the preceding autumn. The seeding was done May 7, and the crop matured in 95 days, August 10. Intense heat dried this crop up before ripening, lessening the yield per acre considerably. The yield was 19 bushels per acre. Measured bushel weighed 63 pounds.

Cost of growing 5 acres of pease—

Rent of land, at $3 per acre	$15 00
⅕ manure, 15 tons to the acre, at $1 per ton	15 00
Ploughing shallow in autumn, at $1.50 per acre	7 50
Cultivating twice in autumn 1½ days	3 75
Ribbing in autumn, 1 day, $2.50	2 50
Cultivating in spring twice 1 5-10 days at $2.50	3 75
Seed, 10 bushels at 80 cents	8 00
Sowing, ½ day, team	1 25
Cutting, team 1 day at $2.50, men assisting, 2 at $1.25	5 00
Threshing, at 2½ cents per bushel, 95 bushels	2 37
	$64 12

Yield, 5,698 pounds, or 95 bushels grain.

Average yield per acre, 1,139 pounds, or 19 bushels.

Total straw on 5 acres, 4 tons 1,000 pounds.

Cost to produce 1 ton grain	$17 33
Cost to produce 1 bushel grain	52
Cost to produce 1 ton straw	3 27
Cost to produce 100 lbs. digestible dry matter, grain	110·7 cts.
Cost to produce 100 lbs. digestible dry matter, straw	43 cts.

MIXED CROP EXPERIMENTS.

Side by side on the first year of the rotation field, that is, on what had been pasture the preceding year, were sown 8 plots of 2 acres each, the aim being to get some data as to the comparative yields of crops grown as mixtures and as pure grains. The yields were materially affected by the bad season. The rank growth of the early part of the season made those mixtures containing pease rather more susceptible to injury from heat than were other mixtures or pure grains. The mixtures and pure grains are as follows :—

	Pounds.
Plot 1, pure pease, Blue Prussian, yielded	2,279
Plot 2, pure barley, Canadian Thorpe, yielded	2,140
Plot 3, pure oats, Banner, yielded	3,637
Plot 4, pease and oats, equal parts by measure	2,022
Plot 5, pease, 1 bushel, oats, 2 bushels, yielded	1,492
Plot 6, oats 1½ bushels, barley 1 bushel, yielded	2,477
Plot 7, wheat ½ bushel, barley ¾ bushel, oats 1 bushel, pease, ¾ bushel, yielded	1,775
Plot 8, pease and oats, equal parts by weight, yielded	2,114

HAY.

As in previous years, the hay crop follows the grain, which comes immediately after roots and corn. At the same time as the grain is sown a heavy seeding of timothy and clover is made. Clover is sown at the rate of 6 pounds red clover and 2 pounds of Alsike per acre, mixed with 12 pounds of timothy seed. Where surface cultivation is practised, and the surface soil for that reason particularly rich in humus, there is very little danger of a miss or failure.

The first cutting of hay is principally clover, the aftermath contains usually a good sprinkling of timothy, and the next crop in the succeeding spring will be chiefly timothy with a slight admixture of Alsike. Two years under hay or hay and pasture is quite sufficient, if it is intended to maintain or increase the fertility of the soil or if it is desired to get the very best returns from the land.

The importance and advisability of giving a good heavy seeding and leaving only a short time down, was well exemplified here this year. Twenty-two dairy cows were pastured on 16 acres and in July it was deemed advisable to cut the grass on the pasture, as it was evident the cattle would not be able to use it to advantage. From the 16 acres were cut 11 tons 1,355 pounds of cured hay.

BROME GRASS FOR PASTURE.

A rather noticeable area in the above 16 acres was a stretch of 4 acres in extent, which had been seeded to brome grass when the rest of the field had been seeded to clover and timothy. The growth was very thick and strong, but the cattle seemed

to prefer it to the other herbage and ate it close to the ground, leaving the timothy and clover on the adjoining land to make such a growth as is indicated above.

Hay was an excellent crop here this year, and leaves a large margin of profit.

Cost of growing clover hay—

Rent of land, at $3 on 37 acres	$111 00
⅓ manure, at the rate of 15 tons per acre at $1 per ton	111 00
½ seed, at $1.50 per acre, 10 lbs. clover, 12 lbs. timothy	46 25
5 days cutting with mower, at $2.50 per day	12 50
3½ days raking, at $1.75 per day	6 13
3½ days tedder, at $1.75 per day	6 12
Rent of farm machinery, oil, &c.	4 50
Cocking, loading, and unloading, 28 days at $1.25	35 00
7 days drawing to barn, at $2.50	17 50
	$350 00

Yield, 3 tons 484 pounds per acre

Total yield, 119 tons 1,908 pounds.

Average amount digestible dry matter in 1 ton, 1,100 pounds.

Cost to produce 1 ton of hay in barn	$ 2 92
Cost to produce 100 lbs. digestible dry matter	26·54
Cost to produce 1 acre of hay	9 48
Cost to produce 1 ton digestible dry matter, labour alone considered	1·17

The second crop on 20 acres of the above was very heavy. It was chiefly clover, but included a small admixture of timothy. It made very cheap hay, as indicated below. The yield was 1 ton 95 lbs. per acre.

Clover, second crop, season of 1901—

20 acres reported above gave a yield of 1 ton and 95 pounds.

Cutting with mower, 2½ days at $2.50	$ 6 25
Raking, 2 days at $1.75 per day	3 50
Cocking, loading and unloading, 10 men at $1.25	12 50
Drawing, teams, 2 at $2.50	5 00
Rent of farm machinery	2 50
	$29 75

Total yield, 20 tons 1,900 pounds.

Cost to produce 1 ton hay in barn	$ 1 42

CLOVER ENSILAGE.

As noted in report for 1900, a small silo was built that year for experimental purposes. This silo was filled for the first time, with second growth or aftermath, principally clover. The grass and clover was mown August 31, 1900, early in the morning and hauled to the silo while still wet with dew. It was thrown into the silo uncut and tramped as firm as possible. The mass of green forage cured into excellent ensilage and was eagerly eaten by the cattle, but was not relished by sheep. There was considerable waste on top and around the sides (probably 10 per cent of the whole amount that it was found possible to place in the silo).

The silo is a round one, built of staves on the plan outlined in Bulletin No. 35. It is 9 feet in diameter by 22 feet in height. Such a silo should hold, when well filled, about 30 tons of corn ensilage. By most careful filling on 3 separate dates we were able to include only 16 tons of the wet forage.

The material as put into the silo contained about 470 lbs. dry matter per ton. Such dry matter is about 70 per cent digestible. Since at least 10 per cent was wasted, there remained only 14·4 tons material. This amount of ensilage would contain 4,318 lbs. digestible dry matter.

The forage came off 3 acres. Below is a statement of the cost of the material in the silo. Naturally, only half the annual rental and manure expenditure are included.

Cost of 3 acres clover aftermath in silo—

Rent of land, half amount, 3 acres	$ 4 50
Manure, ⅓ at 15 tons per acre, $1 per ton, half amount	4 50
Seed, ¼ at $1.50	37½
Mowing, 4 hours at 25 cents per hour	1 00
Raking, 3 hours at 17⅓ cents	52½
Drawing, 1½ days at $2.50 per day	3 75
Men, loading and unloading, 6 at $1.25 per day	7 50
	$22 15

Total forage cured, 14⅔ tons.

Total amount digestible dry matter, 4,318 lbs.

Cost to produce 1 ton ensilage in silo	$ 1 54
Cost to produce 100 lbs. digestible dry matter	51·3

On June 6, 1901, this silo was filled again with practically pure clover. This time, however, the forage was cut into inch lengths. Owing to the material being cut into short lengths, we were able to include 33 tons 660 lbs. in the silo. This, it will be observed, is double the amount included when the forage was put in as mown.

The cut forage cured with very little waste into excellent ensilage, which was eaten with eagerness by dairy cattle as supplementary feed to pasture in August and September. To give some idea of the cost of producing such feed, when first cutting of clover is used rather than the last cutting, the subjoined itemized statement is included. The area from which the clover was removed, served later as a pasture for pigs and sheep ; therefore, only half the cost of rent and manure are charged.

Cost of growing clover ensilage (4 acres)—

Rent of land, half amount, 4 acres	$ 6 00
Manure, ⅓ at 15 tons per acre (half amount)	6 00
Seed, ¼ at $1.50 per acre	37½
Mowing, 5 hours at 25 cents per hour	1 25
Raking, ½ day at $1.75 per day	87½
Drawing, 2 days at $2.50	5 00
Men loading, working at blower and in silo, 10 at $1.25 per day	12 50
	$32 00

Forage produced, 33 tons 660 pounds.

Average dry matter per ton, about 360 lbs. (70 per cent digestible.)

Cost to produce 1 ton ensilage in silo	96·2 cts.
Cost to produce 100 lbs. digestible dry matter	38·2 cts.

CORN (ZEA MAYS).

Four varieties of corn were sown in areas ranging from 2 to 20 acres, the aggregate being 30 acres.

They were sown on land that had been under various grain crops the preceding year, and clover had been sown with all, excepting the pure pease. The soil was gang ploughed in late autumn, a good growth of clover being turned down. Manure at the rate of about 15 tons to the acre was hauled out in the winter, left in small heaps and scattered as the frost was leaving the ground. The soil was ploughed about 4 inches deep, harrowed, and then sown with a force seed drill in rows 42 inches apart. It was impossible to get all the corn into the silos. Particulars of the varieties are as follows :—

Leaming.—20 acres, sown May 27, cut for ensilage September 18 to 26. Yield, 16 tons 1,286 pounds per acre. Growth very strong and even, well cobbed, beginning to ripen. This plot suffered by very severe frost, lessening weight per acre.

Mammoth Cuban.—3½ acres, sown May 27, cut for ensilage September 27. Yield, 17 tons 90 pounds per acre. Growth very strong and even, well cobbed, beginning to ripen. This plot suffered by severe frost.

Mammoth Cuban.—1½ acres, sown May 27, cut and shocked September 28.

Longfellow.—2 acres, sown May 30, cut and shocked September 28. Strong, even growth, corn ripe, well cobbed.

King of the Earliest.—2 acres, sown May 30, cut and shocked September 30. Strong, even growth, cobs short, not as good as any of the other sorts.

Cost of growing 20 acres of Leaming—

Rent of land, at $3 per acre	$ 60 00
Gang ploughed in autumn, 6 8-10 days at $2.50	17 00
⅓ value of manure at 15 tons per acre at $1 per ton	60 00
Ploughing in spring, at $2 per acre	40 00
Harrowing twice, 2 4-10 days, at $2.50 per day	6 00
Seed, 35 lbs. per acre, 500 lbs. at $1 per cwt.	5 00
Sowing, team, 2½ days at $2.50 per day	6 25
Harrowing after sowing, twice, 2 4-10 days at $2.50 per day	6 00
Hoeing, 46 days at $1.25 per day	56 50
Cultivating, 15 days at $2.50 per day	37 50
Cutting with corn harvester, 6 days at $2.50	15 00
Loading, unloading, tramping and putting into silo, 69 days at $1.25	86 25
Drawing with team, 18½ days at $2.50	46 25
Use of engine, fuel, ensilage cutter and engineer for 5 days at $6.50	32 50
	$474 25

Yielded 332 tons 1,720 pounds corn.

Cost 1 ton in silo	$ 1 42⅓
Cost 1 bushel in silo	04.27 cts.
Average amount digestible dry matter per ton (75 per cent digestible)	370 lbs.
Cost to produce 100 lbs. digestible dry matter	38·47 cts.
Cost to produce 1 acre corn	$23 71

MANGELS.

Three varieties of mangels were grown on 6 acres of land. The seed was sown May 14, and harvesting operations began October 18. The varieties were as follows :

Gate Post Red.—2 acres, yielded 20 tons 5 lbs. per acre, or 40 tons 10 lbs., equal to 1,333½ bushels on the 2 acres.

Giant Yellow Globe.—2 acres, yielded 19 tons 1,040 lbs. per acre, or 39 tons 80 lbs., equal to 1,318 bushels on the 2 acres.

Golden Tankard.—2 acres, yielded 22 tons 1,030 lbs. per acre, or 45 tons 60 lbs., equal to 1,501 bushels on the 2 acres.

The dry matter content of the varieties differs slightly. They are as follows :—

Variety.	Digestible Dry Matter in 100 lbs. Roots.	From 1 Acre, lbs. of Digestible Dry Matter.
Gate Post Red	9·29	3,716·46
Giant Yellow Globe	9·10	3,552·64
Golden Tankard	9·63	4,336·39

Cost of growing 6 acres mangels—

Rent of land, at $3	$18 00
Gang ploughing in autumn, 2 4-10 days at $2.50	6 00
⅓ cost of manuring at 15 tons per acre, at $1 per ton	18 00
Ploughing in spring at $2 per acre	12 00
Harrowing, 4 hours at 25 cents	1 00
Drilling, 2½ days at $2.50 per day	6 25
Rolling, 4 hours at 25 cents	1 00
Seed, 24 lbs. at 20 cents	4 80
Sowing, 2 4-10 days at $1.25	3 00
Thinning, 12 days at $1.25 per day	15 00
Hand-wheel hoeing, 7 days at $1.25	8 75
Hoeing, 14 days at $1.25	17 50
Cultivating, single horse, 8 days at $1.75 per day	14 00
Pulling, topping, loading and unloading, 24 days at $1.25	30 00
Drawing team, 6 days at $2.50 per day	15 00
	$170 30

Total yield, 123 tons 1,560 lbs., average, 20 tons 1,260 lbs., or 687⅔ bushels per acre.

Cost to produce 1 ton mangels housed	$ 1 37½
Cost to produce 1 bushel mangels housed	4·12
Average dry matter per ton	187·5 lbs.
Cost to produce 100 lbs. digestible dry matter	73·3
Cost to produce 1 acre mangels	$28 38

TURNIPS.

Two varieties were grown, sown June 8, harvested November 4 ; manure was applied during the winter and spring at the rate of about 15 tons per acre.

Champion Purple Top Swede.—1 acre, yielded 18 tons 520 lbs., or 608⅔ bushels per acre.

Prize Purple Top Swede.—1 acre, yielded 17 tons 1,450 lbs., or 590⅔ bushels per acre.

Cost—

Rent of land, at $3 per acre	$ 6 00
Gang ploughing, 8-10 days at $2.50	2 00
⅓ manure, 15 tons per acre, valued at $1 per acre	6 00
Ploughing in spring, at $2 per acre	4 00
Harrowing, 2-10 days at 25 cents per hour	0 50
Drilling, 8-10 days at 25 cents per hour	2 00
Rolling, 1 hour at 25 cents	0 25
Seed, 6 lbs. at 20 cents	1 20
Sowing, 8 hours at $1.25 per day	1 00
Hand-wheel hoeing, 1 6-10 days at $1.25	2 00
Thinning, 4 days at $1.25	5 00
Hoeing, once, 2½ days at $1.25	3 13
Cultivating, single horse, 2 days, at $1.75 per day	3 50
Pulling, topping, loading and unloading, 9 men at $1.25	11 25
Drawing, 2 days at $2.50	5 00
	$52 83

Total yield from 2 acres, 35 tons 1,970 lbs.

Cost to produce 1 ton turnips housed	$ 1 47
Cost to produce 1 bushel turnips housed	4·41
Average digestible dry matter in 1 ton	209·8 lbs.
Cost to produce 100 lbs. digestible dry matter	$ 0 70
Cost to produce 1 acre of turnips	26 42

HARVESTING TURNIPS.

Much is heard as to the best methods of harvesting turnips, and in order to get some definite information as to the comparative economy of some of the more common plans, a record was kept of the time occupied in harvesting each of 3 equal plots.

Plot 1.—Size, ¾ of an acre. The manual labour required to harvest this plot was equal to 1 man for 24 hours. The turnips were pulled by hand, and the roots and tops removed by a large knife in the hands of the operator.

Plot 2.—Size, ¾ of an acre. The manual labour required to harvest this plot was equal to 1 man for 26 hours 40 minutes. The turnips were topped by means of hoes while still firm in the earth. They were then bottomed, or the roots removed, with the same implements. The topping and bottoming took much less time when done this way than when each turnip passed through the hands of the operator, but much more time was required to load the turnips.

Plot 3.—Size, ¾ of an acre. The manual labour required to harvest this plot was equal to 1 man for 24 hours 5 minutes, besides horse labour of 1 horse for 5 hours. The turnips were topped by means of hoes while still firm in the earth. They were then bottomed, or the roots removed, by means of a single horse cultivator with

all but the 'L' teeth removed. These were set so close as to necessitate the cutting of everything that passed between the standards. As in plot 2, much more time was required to load roots topped and bottomed this way than when handled as in plot 1.

CARROTS.

On account of trouble in keping red carrots in good condition for any length of time, it was decided to abandon for a while the use of this root as a field crop. The method of growing the white carrots was quite similar to that described in previous reports and the variety grown was the Improved Short White. The seed was sown May 15. The carrots made a good rapid growth and were harvested October 21. The yield was 26 tons 1,080 lbs., or 884⅔ bushels from 1 acre.

Cost of growing one acre—

Rent of land	$ 3 00
Gang ploughing in autumn, 4-10 days at $2.50	1 00
½ manure, 15 tons per acre, $1 per ton	3 00
Ploughing in spring, ⅘ days at $2.50	2 00
Harrowing, 1½ hours at 25 cents	37½
Drilling, 3½ hours at 25 cents	87½
Rolling, ¾ hour at 25 cents	18¾
Seed, 3 lbs. at 45 cents	1 35
Sowing, 4 hours at 12½ cents per hour	0 50
Hand-wheel hoeing, twice, 1½ days at $1.25	1 87½
Thinning, 3½ days at $1.25 per day	4 37½
Hoeing once, 1¼ days at $1.25 per day	1 56¼
Cultivating, single horse, 1 3-10 days at $1.75 per day	2 27½
Ploughing out carrots, team, 3½ hours, at $2.50 per day	0 87½
Pulling, topping, loading and unloading, 8 days at $1.25	10 00
Drawing, 1½ day at $2.50	3 75
	$37 00

Grown on one acre, 26 tons 1,080 lbs.

Cost to grow 1 ton carrots housed	$ 1 39
Cost to grow 1 bushel carrots housed	4·18
Average dry matter per ton	200 lbs.
Cost of 100 lbs. digestible dry matter	69½ cts.

SUGAR BEETS.

Two plots of sugar beets were grown, Danish Improved was the variety selected.

To gain some information as to the comparative economy of growing sugar beets or mangels for feed, and to ascertain the relative cost of growing a given area (1) as for forage, (2) as for sugar, two plots of one-half acre each were grown side by side. The ground was prepared as for other root crops, and the same amount of barn-yard manure was applied. In thinning for forage, plants were left 8 inches apart ; but for sugar, 6 inches apart. The hoeing, cultivating, &c., was the same for some time, but when a fair growth had been made, that is, when the plants were about two months old, those intended for forage were treated as mangels, *i.e.*, the upper part of the root left exposed, while those intended for sugar were hilled up, the whole root and crown thereof being covered.

Yield per acre was at the rate of 17 tons 840 lbs. from the forage, and 16 tons 600 lbs. from the sugar plot, or 560⅔ bushels and 543⅓ bushels, respectively

The digestible dry matter content of the roots from the two plots differed materially, namely, 19.50 lbs. of dry matter in 100 lbs. of roots in the case of roots cultivated for sugar, and 18·54 lbs. of dry matter in 100 lbs. of roots intended for forage. Below is the cost of producing sugar beets, (*a*) for sugar, (*b*) for forage :—

(*a*) *Beets (for Sugar).*

Cost of growing one-half acre sugar beets, for sugar—

Rent of land, at $3 per acre	$ 1 50
Gang ploughing in autumn, 2 hours at 25 cents	0 50
½ manure, at 15 tons per acre, valued at $1 per ton	1 50
Ploughing in spring, at $2 per acre	1 00
Harrowing in spring	0 20
Drilling in spring	0 37½
Rolling in spring	0 08
Seed, 6 lbs. at 20 cents per lb.	1 20
Sowing, 2 hours, at $1.25 per day	0 25
Hand-wheel hoeing, 3 hours at $1.25 per day	0 37½
Thinning, 2 2-10 at $1.25 per day	2 75
Hoeing twice, 12 hours	1 50
Cultivating, single horse, 4 times at $1.75 per day, two hours each	1 40
Ploughing out roots, 2 hours at 25 cents	0 50
Pulling and topping, 2 days at $1.25 per day	2 50
Drawing in roots, 6½ hours at $2.50 per day	1 62½
Loading and unloading, 17 hours at 12½ cents	2 12
	$19 37½
Yield on one-half acre, 16,300 lbs.	
Cost to produce 1 ton	$ 2 38
Cost to produce 1 bushel	7:14
Digestible dry matter in 1 ton	390 lbs.
Cost of 100 lbs. digestible dry matter	61 cts.
Cost to grow 1 acre sugar beets	$38 75

(*b*) *Sugar Beet (for Feed).*

Cost of growing one-half acre sugar beets, for feed—

Rent of land, at $3	$ 1 50
Gang ploughing in autumn, 2 hours at 25 cents	0 50
½ manured at 15 tons per acre, valued at $1 per ton	1 50
Ploughing in spring at $2 per acre	1 00
Harrowing in spring	0 20
Drilling in spring	0 37½
Rolling in spring	0 08
Seed, 6 lbs. at 20 cents per lb.	1 20
Sowing, 2 hours, at $1.25 per day	0 25
Hand-wheel hoeing, 3 hours at $1.25 per day	0 37½
Thinning, 1 8-10 days at $1.25 per day	2 25
Hoeing, one day at $1.25	1 25
Cultivating, single horse, 4 times, 2 hours each, at $1.75	1 40
Ploughing out roots, 2 hours at 25 cents	0 50
Pulling and topping, 18 hours at $1.25 per day	2 25
Drawing in roots, 6 hours at $2.50 per day	1 50
Loading and unloading, 14 hours at $1.25 per day	1 75
Yield on one-half acre, 17,420 lbs.	$17 88

Cost to produce 1 ton	$ 2 05
Cost to produce 1 bushel	6·15
Digestible dry matter in 1 ton	371 lbs.
Cost of 100 lbs. digestible dry matter	55 cts.
Cost to grow 1 acre for forage	$35 76

RAPE.

This forage plant has come rather slowly to the front in Ontario, and is practically unknown in the other provinces of the Dominion. As the production of pork, mutton and beef increases, however, it is certain to come more into common use. As a feed for young stock of any description it is unequalled. As a supplementary ration for pigs and lambs it is unrivalled. As a partial ration for 'feeders' when first stabled in autumn it is unexcelled.

The greatest returns from a given area are secured by using as a soiling crop. Excellent results are obtained by pasturing. When sown early and cut for feed it will grow up again. When pastured off not too closely, a growth of nourishing succulent forage is constantly available.

It may be grown with a cover crop or independently. When sown with barley or oats, good results may frequently be anticipated. Under such conditions, however, it is very much more influenced by the vagaries of the weather. When sown alone it may be put in broadcast or in rows. When the soil is strong and the season somewhat advanced, it is occasionally advisable to sow broadcast. Generally speaking, it should be sown in rows from 21 to 30 inches apart. Where the rows are close together, a somewhat greater portion of the plant goes to stalk rather than leaves which are the most nutritious. In rows 30 inches apart there is ample room for full leaf development ; besides, it is much easier to cultivate and keep in a vigorous growing condition.

Rape is a greedy feeder and will do well on the richest land. We have never seen land too strong for it. It is not particular as to the kind of soil in which it shall grow, but is imperative in its demands for large supplies of food. A soil rich in humus is much to its liking.

The plant is quite as rich in protein or flesh forming material as are the legumes. It adds nothing to the soil, however, but is on the contrary rather exhaustive. Where fed off on the field it improves the condition of the land. Rape may not be cured for winter use. If cut late in the autumn, however, and left in small piles to freeze, it may be brought in later, and after being perfectly thawed out may be fed to steers or other cattle.

The preparation of the soil is important. A well rotted sod should be chosen. It should be thoroughly cultivated to a fair depth, say, 6 inches. The seed should then be sown on the flat, unless in very wet soil, when it is preferable to ridge. The seed is sown at about the same rate per acre as turnip seed. The land must be cultivated between the rows for some weeks. The plants should not be thinned in the rows. Under fair conditions the crop may be pastured about the eighth week. It may be cut for soiling about the tenth week.

The seeds of several varieties are on the market. A test of some of these was made this year. Three varieties were sown under similar conditions on similar soil at the rate of three pounds per acre. The results were as follows :—

Plot 1.—¼ acre, sown May 20, in drills 30 inches apart.

Lot 1. *Dwarf Victoria.*—Growth weak, drying out, not desirable.

Lot 2. *Dwarf Essex.*—Growth strong, best of first set.

Lot 3. *Broad Leaved.*—Growth fairly strong, not as broad leaved as Lot 2.

The plot appeared to have been sown too early or should have been fed earlier.

Plot 2.—¼ acre, sown June 1 in drills 30 inches apart.

Lot 1. *Dwarf Victoria.*—Growth fairly strong, better than Plot 1, Lot 1.

Lot 2. *Dwarf Essex.*—Growth strong, even, good colour.

Lot 3. *Broad Leaved.*—Growth medium, not equal to Lot 2.

Plot 3.—¼ acre, sown June 15, in drills 30 inches apart.

Lot 1. *Dwarf Victoria.*—Growth fairly strong, about the same as Lot 2.

Lot 2. *Dwarf Essex.*—Growth about equal to Lot 1, not quite as many wilted leaves.

Lot 3. *Broad Leaved.*—Growth medium, even, not equal to Dwarf Essex.

Plot 4.—¼ acre, sown July 15, in drills 30 inches apart.

Lot 1. *Dwarf Victoria.*—Growth fairly strong, best lot of sort.

Lot 2. *Dwarf Essex.*—Growth strong, even, good colour, best lot in the plot.

Lot 3. *Broad Leaved.*—Growth medium, not equal to Dwarf Essex.

Of the three vericties sown, Dwarf Victoria, Dwarf Essex and Broad Leaved, the Dwarf Essex is apparently the best suited for this section of the country. Under no condition tested was any variety superior to the Dwarf Essex, while in some cases the Dwarf Essex was much superior to the other two sorts. The Dwarf Victoria and Broad Leaved sorts seem to be nearly equal in value for forage, with possibly a slight advantage in favour of the Broad Leaved.

To give some idea of the cost of production, the following statement has been compiled. As most of the rape this year was fed off as pasture the cost of producing a ton of this forage can not be stated.

Cost of growing two acres of rape—

Rent of land, at $3	$ 6 00
Ploughing in autumn, at $2 per acre	4 00
Cultivating twice in spring, 7 hours at 25 cents	1 75
Harrowing, twice, 3 hours at 25 cents	0 75
Rolling, 1¼ hour	0 31
Seed, 6 pounds at 10 cents	0 60
Sowing, 4 hours at $1.25 per day	0 50
Hand-wheel hoeing, once, 8 hours at $1.25	1 00
Cultivating, 3 times, single horse, 1½ days at $1.75 per day	2 62
Hoeing twice, 4 days at $1.25 per day	5 00
	$22 53

The yield per acre ranges from 6 to 30 tons of green feed. The field of rape, the cost of growing, which appears above, was part of an old pasture. It received no manure, but gave a fair stand of forage, probably 15 tons per acre. A similar field heavily manured in 1900 gave over 30 tons per acre.

PUMPKINS.

Half an acre was planted on June 8. The soil was a sandy loam, and well drained. Manure was first applied at the usual rate of 15 tons per acre, worked into the soil. The plot was then thoroughly cultivated and harrowed. It was marked off into 8-foot squares, and a small hole, about 18 inches square and 6 inches deep, excavated at each corner. These holes were half filled with manure, a layer of earth

thrown on top and seed planted. The plants grew well and in a short time covered the whole area. A large quantity of fruit developed and grew to a fair size, the yield from the half acre being 22,470 pounds, or 1,558 pumpkins, averaging 14 1-7 pounds in weight.

These were fed to dairy cattle and swine. The dairy cattle did well on this feed, and it was found difficult to maintain an equal flow of milk after the supply was exhausted.

Swine also did well on them. Dry brood sows were in some cases fed no other food, and maintained their weight.

Cost of production of pumpkins—

Rent, half an acre at $3 per acre	$ 1 50
Gang ploughing in autumn, 2 hours at 25 cents	0 50
Manure, one-fifth applied at rate of 15 tons per acre	1 50
Extra manure in hills, 6 tons, used ½ the value	3 00
Ploughing in spring	1 00
Harrowing twice	0 18
Marking, making hills, and planting 1½ days at $1.25	1 87½
Hoeing, 1 day at $1.25	1 25
Cultivating, single horse, 3 hours, at $1.75 per day	0 52
Hauling, team, 1 day, $2.50, extra man, $1.25	3 75
	$15 07½
Weight produced, 22,470 pounds.	
Cost to produce 1 ton	$ 1 34
One ton contains about 190 lbs. digestible dry matter.	
Cost of producing 100 lbs. digestible dry matter	0 70

REPORT OF THE POULTRY MANAGER.

(A. G. Gilbert.)

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the pleasure of transmitting herewith the fourteenth annual report of the poultry department. The subjects treated are in connection with the experimental work of the year, and are given under their different headings. The most important are as follows:—

1. Results of continued investigation and observation into the cause of so many weak germs in eggs laid by hens in early spring time, before they have had a run outside.

2. What experience has shown to be the best methods for farmers to adopt in the early raising of chickens.

3. The experiences of correspondents in their attempts at early hatching.

4. The want of a simple and inexpensive means of detecting the winter-laying hens from the non-productive ones. Where the present means of doing so are faulty.

5. Foods, their composition and effect. The farm rations and how made up. The rations fed by two farmers.

6. The proper care and feeding of the chickens. Their weight development.

7. New breeds on trial and their characteristics.

8. How the early moulting of the laying stock was brought about. And other detailed information in connection with the experimental work since last report.

Addresses were delivered during the year in different parts of the Dominion on the 'proper breeds of poultry for farmers' and 'the care, feeding and management of fowls so as to make them profitable.' At the Whitby and Renfrew fairs object lessons in the proper methods of killing, plucking and dressing poultry and the management of incubators and brooders were instructive and interesting features. Dressed poultry, consisting of turkeys, geese and chickens were exhibited at the Provincial Fat Stock Show at Guelph, and at the Maritime Winter Fair at Amherst, N.S., and were instructive as showing the farmers how poultry should be prepared for sale for the home markets.

I have pleasure in again mentioning the faithful services of Mr. George Deavey, who assists in the care and feeding of the poultry, &c.

The demand for reports and instruction as to poultry keeping and the breeds best suited for winter layers and rapid flesh makers from all parts of the country, has increased to a remarkable extent, and with an increased correspondence are instances of the rapid development that the poultry department of the farm is making.

I have the honour to be, sir,
Your obedient servant,

A. G. GILBERT.

Central Experimental Farm,
Ottawa, November 30, 1901.

REPORT OF THE WORK OF THE PAST YEAR, 1901.

The experiments and observation in connection with the procuring of eggs in winter to be sold for eating purposes, or their conversion by means of artificial incubation into chickens, technically known as broilers, were continued last season. Much attention has, in recent years, been directed to the latter part of the work. In the report of my department for 1900 (last year), results were given of the attempts made during the previous winter season to ascertain the cause or causes of the weak germs in so many of the fertilized eggs laid by hens and pullets during that period, and which resulted in a large percentage of the embryos dying, in the course of incubation, notably at the 'pipping' stage. This large percentage of loss is a serious drawback to the successful prosecution of an enterprise that offers a large margin of profit. It was shown by last season's operations that it was easier to get the fertilized egg than the strong germ so necessary for the hatching of the robust chicken. This is an important point to remember, and in reference to it a leading poultry paper remarks: 'Is a distinction that is hardly ever given any thought. If the eggs are fertile that is as far as we have gone.' The results as given in report of last year attracted widespread attention, and the hope was expressed that investigation would be continued until a satisfactory solution of the difficulties is discovered, if such be possible.

WHAT PAST EXPERIENCE HAS MADE EVIDENT.

The experience so far gained in connection with this important work shows that there is room for much study and experiment. The close observer cannot fail to realize how many are the factors to be considered, how finely adjusted must the balance be, in the treatment of his stock, so as to have them profitably productive during the winter months, when it is so much against their natural instinct to be so. In fact so great have the drawbacks in connection with the artificial hatching and rearing of chickens, during that season been found by many persons, that they unhesitatingly state their belief that more money is to be made out of the sale of winter eggs at the city prices of 35 and 40 cents per dozen than by their conversion into broilers, worth later on $1.25 to $1.50 per pair. However open this statement may be to challenge there can be no denial of the ever increasing demand for both winter eggs and early broilers. The high price offered for the latter is doubtless the incentive to their production. The numerous letters received from farmers and ambitious beginners asking for information on the subject is proof of this. In such cases the advice given in report of last year still holds good. It is to the effect that with the facilities usually at his command the farmer or beginner should be content with the production of winter eggs and late April or May chickens rather than to attempt the raising of broilers which requires expert knowledge and a special plant. The large poultry purchasing companies established in different parts of the provinces in recent years, and which are the outcome of the rapid development of the poultry interests of the country, call loudly for a well grown, plump July or August roaster. This demand should easily be filled by farmers who have the rapid flesh-making Plymouth Rocks, Wyandottes or Buff Orpingtons. That it affords a profitable margin of profit is beyond question. Doubtless there are farmers who are engaged in broiler raising, but their number is few and they are possessed of all the requisites to success in knowledge, facilities and near-by city market. The situation from the farmers standpoint is well described in the following note from the wife of a widely known farmer :—

'Engleside Farm,
'Brockville, Oct. 22, 1901.

'The Manager
'Poultry Department, Experimental Farm,
'Ottawa.

'Dear Sir,—In reply to your question as to which pays best, from a farmer's standpoint, sale of new laid eggs in winter at 35 to 40 cents per dozen, or their con-

version into broilers to sell at $1.25 to $1.50 per pair. I think it best to sell the eggs at city prices. Unless a farmer had all the necessary plant and number of hens he could not make broiler raising pay.

'MRS. W. J. N.'

SOME OBSERVATIONS CONFIRMED.

The observations of last winter were confirmatory of those of the previous season. If they pointed to one of the suspected causes more strongly than another it was to the effect of the extremely artificial conditions under which the laying stock existed. It again seemed evident that until the hens had a run outside, and so had opportunity to recuperate from this long term of artificial life that a satisfactory percentage of strong germs could not be had. And the term of artificial life last season was unusually long, the hens going into winter quarters in mid-November and so remaining until the disappearance of the snow in the following spring. A secondary course, perhaps, may be traced to the composition of the rations, quantity and frequency with which they were fed. The composition and manner of feeding the rations is shown in another page.

It was remarked in report of last year that variety in the composition of and method of feeding the rations was beneficial, at all times, but indispensable in the month of March, if egg eating and feather picking were to be avoided. The observations of last spring emphasized this in no uncertain manner. This experience coming after an unusually long term of winter confinement makes it all the more striking.

Indeed, the observations of many years go to show that a regular supply of pure water, green food, grit, &c., are imperative, where success is the object.

THE WORK OF LAST WINTER AND RESULTS.

The work of last winter may briefly be described as follows:—Soon after going into winter quarters the hens were mated up, when possible, with two-year old male birds. At the end of December the eggs were saved for hatching. At that time the hens had been laying fairly well for a month. On the 6th of January an hundred egg incubator was filled, and throughout the winter months more eggs were placed in other incubators, which were as carefully attended to as circumstances would permit. The conditions under which the incubators were operated were perhaps a little harder, owing to the more severe and protracted season, but results were little different from those of the previous year and were most discouraging.

December and January eggs showed on examination a much larger percentage of dead germs in different stages of development than unfertile or clear eggs. Numerous fully developed chicks dead in shell, many at pipping stage. In some cases they were nearly 50 per cent of the tested eggs. This clearly pointed to weak germs. Some idea of the unsatisfactory results may be had from the following instance. On the 5th of February 180 eggs laid during the previous month of January by Plymouth Rock, Wyandotte, Langshan, Indian Game and White, Buff and Brown Leghorn hens were placed in an incubator. These eggs were hatched on the 26th of February, and resulted in 26 chickens. Six of the number were cripples and were killed. In this case after deducting 30 per cent of clear eggs and three full grown chicks which died in coming out of the shell, the memorandum made at the time reads: 'That all the remaining eggs contained dead germs in different stages of development. The hens were apparently in the best of condition and the eggs from them were large and full.' It may be noted that a Brown Leghorn pullet, one of the 26 hatched on February 26, laid her first egg on the 17th of July following, 4 months and 17 days after coming from the shell. Five days later two White Plymouth Rock pullets, and a cross pullet of the same group, laid their first eggs. Whether it is advisable to have such early laying pullets or not is shown on a following page.

MARCH AND APRIL EGGS.

The eggs of early March did not show much improvement. At end of the month the layers had opportunity to enjoy a run out, although to a limited extent. The effect on the vitality of the germ seemed beneficial, as is shown in the following results:—

On March 26, 13 White Plymouth Rock eggs were put under a broody Dorking hen. Result, 6 chickens ; 3 clear or unfertile eggs ; 1 addled egg, or one in which germ had started and then died ; 3 fully developed chicks dead at pipping stage.

On the day following, 27th instant, 13 White Wyandotte eggs were placed under a White Indian Game hen, and 13 B. P. R. eggs under a pullet of the same breed. The result in the first case was 9 chickens; 1 clear egg; 1 egg broken in nest by hen; 2 chicks dead at pipping stage. In the second, 8 chickens were hatched; 2 chicks dead in shell; 2 addled eggs. April eggs gave equally good results.

AN ASSUMPTION AND A WANT IN CONNECTION THEREWITH.

At the advent of spring the egg yield increased, and it was reasonable to assume that the hens which had not been laying in previous winter months were doing so then; also that the germs contained in their eggs were much stronger than in the eggs of the mid-winter layers. Was this actually the case?

A want that made itself felt in this connection was a means of detecting the non-productive hens from those which were regular layers. Close observation has led to the conclusion that only a small percentage of the fowls, noticeably so in the case of certain breeds, lay as frequently as is desired during the winter. On the arrival of spring a number of hens of the sitting varieties become broody, some earlier than others, and they are given eggs to hatch out. Yet the egg yield notably increases. The hens which have become broody are likely those which have been among the steady winter layers. If so their places have been undoubtedly taken by others. It is important to find out the tardy layers. Of course, no reference is made to the late hatched pullets of the previous year and which would not likely become productive until maturity at this season. A partial response to this exigency has been made in the shape of trap nests, of more or less merit, which in recent years have been placed on the market. In our department trial has been made of several patterns. Their use has led to the conclusion that they are certainly effective and valuable in the case of small flocks, but where there are many hundreds of hens, and labour saving is an object, they are likely to be a source of expense. And in this way: In the earlier half of the day the hens usually lay. During that period it would require, in a large establishment, so much attention on the part of one man to register the number of each layer, release her from and reset the trap as to fully occupy his time. To be reliable the work must carefully be attended to. It may be said that the value of discovering the non-productive hens, particularly during the season of high prices cannot be overestimated. Especially is this so in the case of the skilled breeder (as already mentioned) with his limited number of breeding pens of high class birds and who receives an unsually high price for his eggs which he sells for hatching exhibition birds. There is no intention to question the value of the trap nest to him. What is desirable is the extension of the trap nest principle, so that the proprietors or managers of the large establishments, who sell eggs for eating purposes, or for conversion into early broilers, may be enabled with little cost, certainty and despatch to detect the prolific layers from the non-productive ones.

DIFFICULTIES IN EARLY HATCHING FELT BY MANY PERSONS.

That the difficulties, as related in report of 1900 (last year), in connection with the early hatching of chickens were experienced by many others, was shown by the number of letters received during the early part of last summer on the subject. The

majority of the letters came from correspondents living in parts of the country where winter conditions are similar to ours, and told of early attempts at hatching and subsequent discouraging results. Many correspondents ended their letters with the statement: 'that this has been the worst year for early chickens ever known in this part of the country. It seemed almost impossible to have fertile eggs.' And again, 'the number of full grown chicks which were dead in the shell at hatching time was astonishing. They seemed unable to free themselves from the shell. Do you think my incubator is a good one?' An explanation of the cause and a remedy were generally asked for. In response a copy of report of last year, dealing in a preliminary way with the same difficulties, was at once forwarded. As to the results from the incubator the opinion was expressed that the probable fault was in the condition of the breeding stock rather than the machine. The statement 'that the experience was the worst ever known in that district' may be explained by the probability that efforts were made by more people, in the districts heard from, to have early chickens than ever before. The general demand in recent years for information as to the most reliable and easily operated incubators and brooders, and the expressed intention of purchasing them may fairly be taken as an indication that a large number are now in use, and the disappointing results, in connection therewith, may have called attention to obstacles to success which previously existed, but which were not so widely experienced. It is to be hoped that the attention which is now being directed by so many to the subject, apart from our experimental work, may lead to a solution of some, if not all, of the obstacles which at present seem to bar the way to unqualified success.

With this object in view it is requested of those who engage in the early hatching of chickens, and who meet with the difficulties outlined, to send to our department a description of the obstacles encountered and the suspected cause or causes.

THE FOOD AND ITS EFFECT.

It has been stated that past observations lead to the conclusion that next to the long term of artificial life in comparatively limited quarters, the food and its composition and frequency with which it is fed, has the greatest effect on the health of laying stock and vitality of germ. That such is recognized as an important influence is shown by the frequency with which the influence of the 'mash,' as a part of the daily ration, for good or bad, is discussed by leading breeders. On one hand we have the advocates of the 'dry' or 'whole grain' system of feeding, with the usual essentials of green food, grit, &c., and variety in the grains fed as well as manner of feeding. On the other side are those who combine the use of the mash with whole grains and the essentials. The contention of the first named is that the use of the mash is attended with injurious effect. Of the second party, that it is an important and wholesome incentive to the production of eggs in winter. The experience gained in our poultry department, after many years, points to beneficial effects when the mash is judiciously used. The following summary of the experience learned may be useful:—

1. When fed in too great quantity to one and two-year old hens it is apt to create an over-fat condition. In the case of the latter, if of the heavy breeds, this over-fat condition is likely to be fatal.

2. If fed in too great quantity as a morning ration it is likely to make the hens disinclined for exercise.

3. It is decidedly a valuable aid to moulting hens.

4. It is a convenient form of utilizing much of the farm and farm-house waste.

5. Where hens have had a comparatively free run its beneficial effect in egg production has been noticeable.

6. It is an invaluable means of quickly fattening old or young stock, in a more or less liquid form.

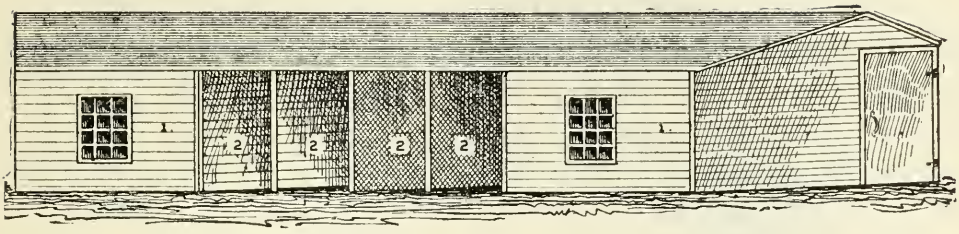
As to the quantities in which the mash should be fed, much depends upon its stimulating composition or otherwise. As ordinarily made it is composed of ground grains of different sorts with cooked roots or vegetables as a part. The mash as used by a farmer in the vicinity of Brockville, and described by him in a recent letter may be taken as fairly representative, viz.:—

'Morning ration for 250 hens and pullets, one and a quarter bushels of roots, pulped and made crumbly with provender. When provender alone is used, boiled meat is added.' The meat is presumably a form of waste. In many cases the soft feed is given in the afternoon. Under any circumstances the hour of feeding may be varied with benefit.

As to quantity in which it is to be fed, the practice in our department has been, when fed in the morning or at noon, to give enough to satisfy but not to gorge. Between the two extremes of too little and too much, as a morning or noon ration, doubtless lies the safety line. When fed as an afternoon winter ration, a large rather than small allowance is permissible, for there is the following long night fast to permit of leisurely assimilation. In some cases it is advisable, if the mash is fed in the early afternoon, to throw a few handsful of grain in the litter on the floor, where the layers may find it at that time, or, when daylight permits of search being made for it next morning.

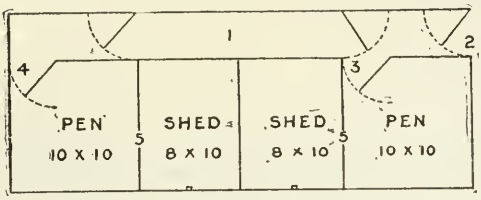
A PERTINENT QUERY.

Past observation has led to the conclusion that when the feeding of the mash, or any other form of rations, has had an enervating effect on the layers that strong germs are not likely to follow. This is more likely in the case of old hens of the heavy breeds. Indeed, no hen out of condition is likely to lay an egg with a strong germ. This leads to the query, are hens while in winter quarters and laying well during that period out of condition? In a state of nature the hen is not likely to lay in winter weather. We make the conditions of her winter life as like those of spring, or early summer as possible, and we get eggs, but they are not as reproductive as desirable. Are compromise conditions in the shape of 'poultry house and scratching shed' the correct ones? And in this there is room for useful and interesting experimental work. On this point it may be interesting to note the experience of Mr. William Moe, a farmer living at Franklin, Que., where the winter is rigorous and snowfall heavy. He says: 'We send our winter eggs to a Montreal grocer and receive 40 cents per dozen for them. Our plan of feeding grain is to throw it on the floor of the "scratching shed," so that the fowls will have to work to find it. We have the scratching sheds attached to our poultry houses. We got the plans from Mr. A. F. Hunter, of South Natick, Mass.' One objection to the scratching shed attachment, in certain parts of the country, has been the exposure of the laying stock to the cold of winter, but Mr. Moe evidently does not find this an obstacle to obtaining eggs in winter. Strong advocates of poultry houses, constructed on similar plans, are Mr. L. H. Baldwin, of Deer Park, Toronto, and Mr. J. M. Wilson, Manager of the Toronto Poultry Farm. Both have adopted the principle in the construction of their poultry houses, the latter on an extensive scale. The following diagram will show a poultry house with the shed attachment:—



FRONT ELEVATION.

1. Roosting and laying room. 2. Scratching shed.



1. Passage way.
2. Door.
3, 4. Entrance to pen.
5. Passage way to sheds There may be more than one.

GROUND PLAN.

The objection to the use of the open scratching shed, in the colder parts of the Dominion, that it is too exposed to the cold and snow storms of winter has been to a great extent overcome by having a thick cotton curtain in front of each shed to be pulled down in case of a storm and rolled up on fine, sunny days. In some cases a covered shed has been found to answer. Many farmers have opportunities for allowing their fowls a run, on fine days, in an open shed with southern face. In several cases, known to the writer, farmers have their poultry houses so arranged that their fowls have regular access to open sheds into which the sun shines brightly on many winter days. In the above diagram it would be an improvement to have the roosting and laying houses the smaller of the two, and the scratching shed of the larger dimensions. It is safe to allow no less than six square feet of floor space, under any circumstances, to each hen and as much more as can conveniently be spared.

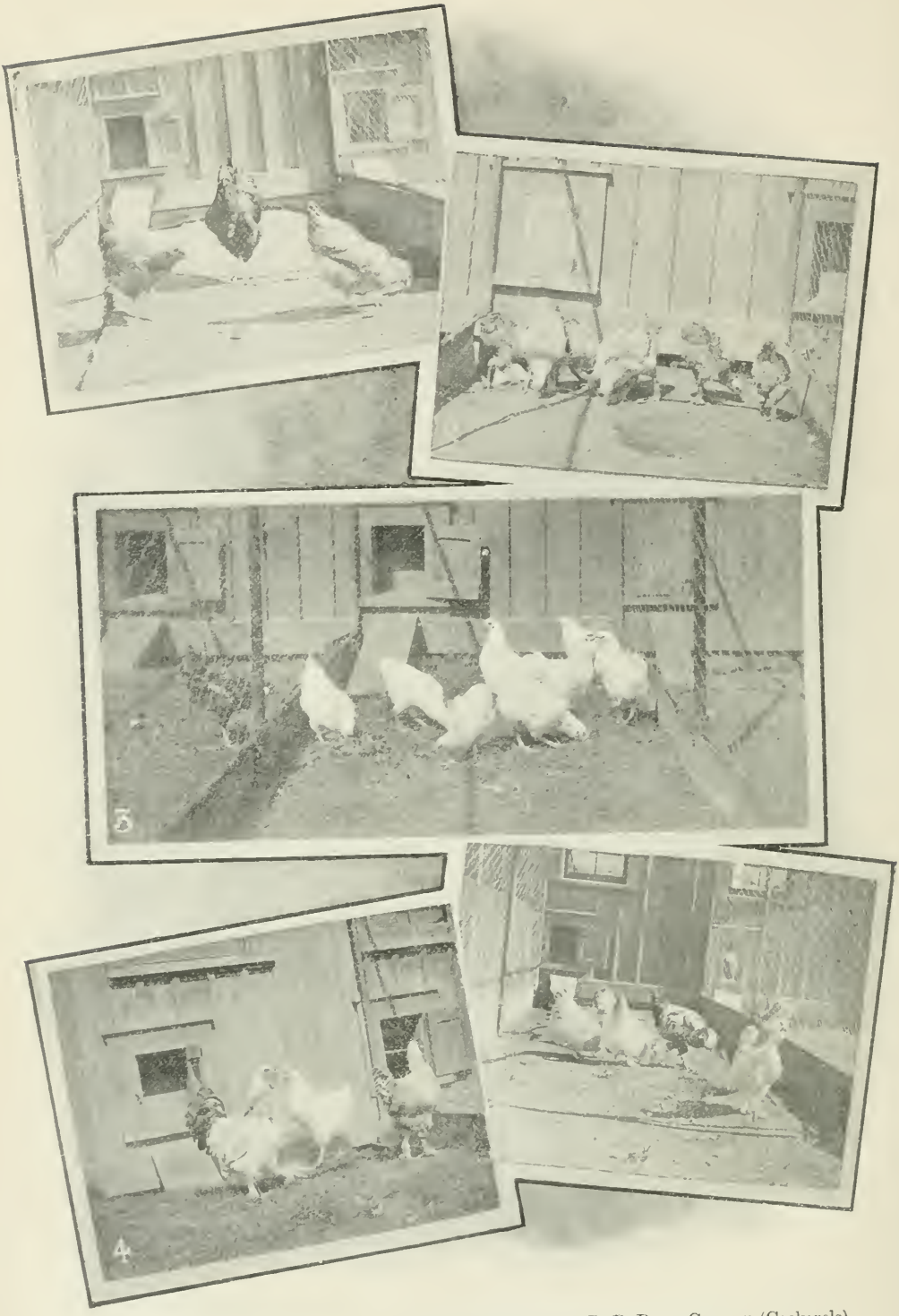
BREEDING PENS MADE UP.

On the fowls going into winter quarters the following pens of fowls were mated with vigorous young males in order to obtain, if possible, early and strong chickens. The results of this experimental work are given in previous pages:—10 White Leghorn hens, 15 Brown Leghorn hens, 10 Black Minorca hens, 6 White Minorca hens, 11 Barred Plymouth Rock hens, 8 White Plymouth Rock hens, 14 mixed hens.

In addition to the foregoing the following were added at the dates designated:—

1901.	Description.	Hens.	Pullets.	Cocks.	Cockerels.
Jan. 4	Langshans	11		1	
" 9	Barred P. Rocks		9		1
" 9	Buff Leghorns	9			1
" 11	Andalusians	11		1	
" 17	White P. Rocks		9		1
" 17	White Wyandottes	9		1	
" 17	Langshans		8		1
" 17	Buff Leghorns		8		1
Feb. 25	Barred P. Rocks	9			1
Mar. 20	Black Minorcas	7			1
	Crosses.				
Mar. 20	L. Brahma-P. Rock	9			1

As the hens became broody they were placed in wooden boxes, without bottoms, and with a hinged door in front. For early sitters one of the Wyandotte varieties, or one of the cross-bred hens were chosen as they were lighter than the heavier Plymouth Rocks or Leghorns. In some cases the nests were made of dry lawn clippings, which were found to answer the purpose admirably. In others oat straw was used. Three or four china eggs were placed in the nest, and on these the hen was allowed to sit for a couple of days. Meanwhile a thorough dusting of insect powder was given to both hen and nest. The powder in the feathers of the hen and in the nest probably rid her of any vermin and prevented their lodgment in the straw or grass. At end of two days the valuable eggs were given to the sitter. Food, water and grit were convenient to the sitters at all times. When the sitters left their nests to feed, generally in the morning, the eggs were examined. Should an egg have been broken it should be at once removed with the soiled straw, and the other eggs at once carefully washed in slightly warmed water and returned to the nest. Should the eggs be allowed to remain soiled no satisfactory results need be anticipated. In some cases the breast feathers of the sitters became soiled. If so they should be at once thoroughly cleaned, or the newly washed eggs will again be soiled. If circumstances will permit a number of broody hens should be set at the same time. At the end of six or seven days the eggs with light coloured shells, and at nine days the eggs with dark shells, should be tested, and the clear or unfertile ones removed. The fertile eggs should then be given to the hens which may require them, in order to have the full sitting, usually 13. The spare hens can then be reset. Egg testers can be procured, without any difficulty, from a dealer in poultry supplies. Where incubators and brooders are used, different rules as to care and management are observed. These rules accompany all the machines. But whether hens or incubators are used as hatching mediums, care and attention during the period of incubation are necessary. In too many cases the hens, or incubators, have to bear the blame that rightfully should be borne by manager or operator.



1. Buff Orpingtons.
2. L. Brahma and B. P. Rock Crosses (Cockerels).
3. White Wyandotte Pullets.
4. Cross Bred Cockerels Fattening.
5. Salmon Faverolles.

EGGS SET AND CHICKENS HATCHED.

The following list will show the number of eggs set and result in chickens:—

Date.	Description of Eggs.	When Hatched.	No. of Chicks.
Mar. 26	13 White Plymouth Rock eggs	April 16	5
" 27	13 White Wyandotte eggs	" 17	9
" 27	13 Barred Plymouth Rock eggs	" 17	8
April 18	13 " " from Grand Pré, N.S.	May 9	8
" 18	13 " " " "	" 9	10
" 19	13 White Wyandotte eggs	" 10	8
" 19	13 White Plymouth Rock eggs	" 10	10
" 22	13 Buff Leghorn eggs	" 13	10
" 30	13 Light Brahma-Plymouth Rock eggs	" 20	12
" 30	13 " " "	" 20	8
May 1	13 Barred Plymouth Rock eggs	" 21	9
" 1	13 Buff Leghorn eggs	" 21	9
" 2	13 Barred Plymouth Rock eggs	" 23	10
" 2	13 White Leghorn eggs	" 23	11
" 2	13 Buff "	" 23	8
" 4	9 Light Brahma—4 White Wyandotte eggs	" 25	7
" 10	14 Barred Plymouth Rock eggs	" 31	11
" 11	15 Light Brahma—Plymouth Rock cross eggs	June 1	11
" 11	13 Black Minorca eggs from Gatineau Point	" 1	3
" 13	13 White Wyandotte eggs	" 4	7
" 13	13 White Leghorn eggs	" 4	7
" 15	13 Barred Plymouth Rock eggs from Ottawa East	" 6	7
" 18	15 Buff Leghorn eggs from Cobourg	" 9	7
" 22	13 Barred Plymouth Rock eggs from Ottawa	" 13	10
" 23	13 White Wyandotte eggs	" 14	9
" 24	13 " "	" 15	8
June 18	13 Barred Plymouth Rock eggs from Ottawa	July 10	11
" 18	13 " "	" 10	8
" 21	7 Barred Plymouth Rock—8 White Wyandotte eggs	" 12	10
	384		251
	(A little over 65 per cent of the above eggs hatched.)		
	Incubator-hatched chickens		145
			396

After hatching, the chicks were allowed to remain under the hen, or in incubator, until strong on their legs. This may be 24 or 36 hours after coming out of the shell. If incubator-hatched the chickens were removed to brooders, which, if the season was advanced enough, were placed outside. If hen-hatched, and the weather permitted, the mother hen and her brood were placed in coops which were put on the grass of a field. The grass in this portion of the field was kept short by grass mower, and the field was surrounded by wire netting. The coops had slatted fronts and were so arranged as to permit of their being securely fastened at night, while abundant ventilation was provided. From time to time the coops were moved to new ground. As in past years on removing the hen and her brood from the nest, the hen was given food and water before placing her in the coop with the chicks. She had been on the nest for 36 hours, hatching out her chicks, and during that time had partaken of no food or drink, and was probably much in need of both. If not so fed she is likely to greedily eat up the comparatively dainty food intended for her brood. Again, her hunger and thirst being appeased she was much more likely to brood her chicks in quiet than if allowed to remain in want of food and drink. The first feed of the chicks was stale bread crumbs, followed some hours later by stale bread soaked in skimmed milk and

squeezed dry. This was fed a little at a time and often. Never in quantity enough to gorge, and none was allowed to remain about to turn sour. After a day or two granulated oatmeal was given, and when convenient boiled rice. This food was given for a week or ten days when a change was gradually made to a mash composed of stale bread, oatmeal and cornmeal mixed with skimmed milk and fed in a crumbly condition. Skim milk and water with fine grit were also provided. No grain was given until the 12th or 14th day, and then it was fed a little at a time and at night, until the chicks were accustomed to it, when they were sent to brood for the night with their crops full. Wheat was found the most satisfactory grain. As his chicks progress the farmer should be able to utilize the table and kitchen waste, such as broken crusts, potatoes, potato peelings, unused oatmeal or cornmeal porridge, &c., &c., with great benefit. Salt and fat meat should not be used, and the peelings, &c., thoroughly cooked. The feed should be wholesome, plain, nutritious and need not be expensive. The chickens require care and attention during the first five weeks of their growth, for during that period they are slowly but surely feathering. The chicks of the Leghorn and kindred types will be found to make the most rapid development during the first few weeks, but those of the heavier breeds, such as Plymouth Rocks, Wyandottes or Orpingtons, will later on more than compensate by gain in weight. The mother hens should be allowed to remain with their chickens until the latter are fully feathered. They should then be removed to the runs with the other hens, and if in good condition by this time should be laying or about to do so. With such care and treatment as outlined at end of three or three and a half months the birds should be ready for sale, to either private customer, to city store, or to one of the large purchasing companies, which are being formed in different parts of the Dominion. At the age mentioned and with the care and food as advised, the young cockerels of the Plymouth Rock and Wyandotte breeds and Buff Orpington variety should weigh 3½ pounds or 4 pounds each. And the earlier they attain these weights the better price will they bring. A good plan is to put the chickens in crates and feed them well for three weeks before selling them. The benefit of so doing is shown further on.

WEIGHT DEVELOPMENT OF THE CHICKENS.

Treated and cared for as outlined from time of hatching the farm chickens made rapid and satisfactory development, as the following figures will show. The chicks were hatched in incubators and reared in brooders, while others were hen-hatched and reared.

Incubator-hatched on 26th February. Weighed on 4th June following, 3 months and 5 days of age.

	Lbs.	Oz.
Barred Plymouth Rock Cockerel	3	5½
White Wyandotte Cockerel	3	5½
Light Brahma—B. P. Rock Cross-Cockerel	3	5
Light Brahma—C. Dorking Cross-Cockerel	3	8

Such chickens as the above would command a handsome price, but as they require special facilities to rear them during the month of March and the early part of April, the farmer with his ordinary means is not likely to have them. But with the aid of incubator and brooder the farmer should be able by the first or second week in May, most likely earlier, to have a large number of chickens hatched and growing rapidly in a brooder, or brooders, with opportunity for the young birds to run out on the rapidly

growing grass. By means of hens he is not likely to have similar results, for it is only the winter layers which will make the early sitters, and then only in limited number. The non-winter layers beginning their output of eggs in spring, will lay their quota before becoming broody, and their chickens are more likely to be brought out in mid-June than early May.

Proof of this will be found by reference to the table of eggs set and chickens hatched, to be seen in a preceding page. This table shows that three early sitters were available on the 26th and 27th March. They were placed on eggs at the dates mentioned, and hatched out 22 chicks in April. Four other sitters were set on 18th and 19th of April, and hatched 36 chickens, making with the 22 chickens hatched in April a total of only 58 chickens by middle of May. And the hens of the poultry department had laid fairly well during the previous winter. With the same percentage of strong germs, which gave 8 and 10 chicks out of 13 eggs, as the table also shows, and an incubator of 220 egg capacity the farmer should have 170 to 175 strong and robust chickens. The moral is obvious.

PROGRESS MADE BY CHICKENS FED IN CRATES.

On the 1st day of August the four cockerels hatched in an incubator on 26th February, were put in fattening pens upstairs, and were hand fed three times per day on a ration of two parts ground oats, one part shorts, one part cornmeal, the whole being mixed with skimmed milk. Quantity fed per day, one pound. The following gains were made:—

Varieties.	Aug. 1.		Aug. 7.		Aug. 15.		Aug. 21.		Aug. 28.		Sept. 4.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
1. Light Brahmas and P. Rock cross .	5	10	6	1	6	9	6	12½	6	14½	7	3½
2. " C. Dorking cross	5	12½	6	5	6	12½	7	2½	7	9½	7	12½
3. White Wyandotte.....	5	12½	6	2½	6	10½	6	14½	7	4½	7	9
4. White Plymouth Rock.....	4	5	4	5½	.....		4	14½	5	2½	5	9½

Soon after being put into the pen the White Plymouth Rock cockerel became sick, and was replaced on 21st August by another of the same breed.

All the birds were moulting previously to, or began to moult heavily soon after being placed upstairs. This, no doubt, was a drawback to rapid flesh making. The lesson taught by this experience is that birds should be put into the fattening pens either before or after they begin to moult, at 4½ or 5 months of age, preferably the earlier period.

EXPERIMENTS WITH BIRDS IN FATTENING CRATES, LIMITED AND UNLIMITED RUNS.

In order to ascertain the difference in gains made by birds in fattening crates, limited and free runs, the following comparative tests were made :—On 12th August two groups of 4 chickens in each group, and of same age, viz., 4 months and 3 days, were selected and bands with distinguishing numbers placed on one of the legs of each bird. The rations were composed of coarsely ground grains, such as farmers would likely have at hand, and of the following description and quantity, viz.:—2 parts cornmeal, 1 part coarsely ground oats, 1 part shorts or buckwheat meal.

GROUP 1.—In fattening crate upstairs.

Variety.	Aug. 12.		Aug. 19.		Aug. 26.		Sept. 2.		Sept. 9.		Sept. 17.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
No. 34. White Wyandotte	4	10½	5	00	5	4½	5	6½	5	7½	5	12½
No. 33. "	4	6½	4	13½	5	6½	5	12	5	14	6	3½
No. 39. "	4	2½	4	10½	5	2½	5	½	5	4	5	10
No. 47. Barred Plymouth Rock	5	2½	5	9½	6	0	6	5½	6	10	7	0

GROUP 2.—Limited run.

No. 30. White Wyandotte	4	1½	4	9	4	13	5	2½	5	4½	5	8
No. 40. "	4	1½	4	7	4	11½	4	14	5	0	5	2
No. 61. "	3	11	4	0	4	3	4	9½	4	12½	5	2
No. 67. "	3	14½	4	4	4	8	4	10½	4	15½	5	2

The following will show the gains made by chickens placed in fattening pens upstairs and others on a free run. On 19th of August four Light Brahma B. Plymouth Rock cross-bred cockerels, incubator-hatched, were picked from a number running in a field. The birds were all three months of age. Leg bands with distinguishing numbers were placed on the chickens. Two were placed in fattening crates upstairs, and the other two were allowed to run in a field. The following figures will show results:—

In Fattening crate upstairs.

Variety.	Aug. 19.		Aug. 26.		Sept. 2.		Sept. 9.		Sept. 17.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
No. 2. Light Brahmas-Plymouth Rock cross	3	9	4	2½	4	10½	4	15½	5	7
No. 3. " " "	3	10	4	4½	4	12½	5	4½	5	13½

Allowed free run.

No. 50. Light Brahmas-Plymouth Rock cross	3	8½	3	14	4	5	4	7	4	13½
No. 9. " " "	3	3½	3	9	4	0	4	0	4	3½

BUFF ORPINGTONS, RHODE ISLAND REDS AND SALMON FAVEROLLES ON TRIAL.

During the latter part of the summer season three comparatively new comers were added to our poultry department, viz., Buff Orpingtons, Rhode Island Reds and Salmon (or Saumon) Faverolles. Briefly described some of the characteristics of the new varieties are as follows:—

BUFF ORPINGTONS.—One of three varieties of a well-known English breed composed of White, Black and Buff varieties. They are strongly recommended as winter layers and rapid flesh formers. The Buff variety have light legs and a white flesh which make them particularly suited to the requirements of the English, as well as home markets. Figures showing flesh development are given further on.

Rhode Island Reds.—As their name indicates is of eastern United States origin, and are said to be good winter layers, hardy and quick growers. Owing to a pronounced yellow colour of leg and tinge of flesh, they are likely, for the present at any rate, as a market fowl to be more suited to the United States taste for yellow skin, than for export. This at once limits their field of usefulness as compared with the Buff Orpington.

Salmon Faverolles.—Are of French origin, although bred for some time past in England. They are the first of this breed to be brought to Canada, and are found in only one place in the United States, viz., the States Valley Farm of Simsbury, Conn. The Salmon or Saumon Faverolle is the most preferable of several types. It is a mixed breed with Houdan, Dorking, Brahma, and may be Cochin, showing in one fowl. Their merit is said to be that of a table fowl of small bone and fine quality of flesh. And undoubtedly they are such. In the Parisian market they bring the highest price. Mr. T. H. Robinson, the English Faverolle breeder, says of them : 'that they will attain a size and weight, with less trouble, than some of our finer breeds and a young fowl of this breed will leave nothing in the way of quality to be desired.'

FLESH DEVELOPMENT OF FOUR BUFF ORPINGTON COCKERELS.

With a view of finding out their merit as flesh formers, on the 26th August four Buff Orpington Cockerels were purchased from a breeder near the city. They were hatched on 1st of June, and had received no special care or feeding. One bird showed evidence of neglect.

Four Buff Orpington Cockerels hatched 1st June, 1901. Placed in pen with Limited run on 2nd September following at 3 months and 2 days of age.

Variety.	Sept. 2.		Sept. 9.		Sept. 16.		Sept. 23.		Oct. 2.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
No. 21	3	7½	3	12½	4	4	5	½	5	10½
No. 12	3	12½	4	½	4	9	5	½	5	11
No. 20	3	9½	3	15½	4	6	5	3½	....	.....
No. 25	2	13½	3	2	3	8½	4	2½	4	12

These birds were not weighed again until the 11th November following, at age of 5 months and 11 days, when they were compared with White Wyandotte cockerels of age of 7 months and 2 days. Conditions as to care and feeding were the same in both cases.

Four Buff Orpingtons, at age of 5 months 11 days:—

	Lbs.	Oz.
No. 21	7	2
No. 12	7	2½
No. 15	6	½
No. 20	5	10

Four W. Wyandottes, 7 months 2 days old:—

No. 61	7	2
No. 67	6	13½
No. 40	6	7½
No. 30	7	4½

PROGRESS OF SIX RHODE ISLAND RED COCKERELS.

Six Rhode Island Red Cockerels hatched at different times during the month of May, were purchased from a breeder in Nova Scotia, and had been taken from a free run in the fields when shipped. They were strong and healthy chickens, but thin when received on 27th September. On the 4th of October they were placed in a pen, with limited outside run, when the following flesh development was made. Rations same as given to other chickens, viz., 2 parts coarsely ground oats, 1 part cornmeal, 1 part shorts. This ration was altered from time to time, ground barley sometimes taking the place of shorts and cornmeal at others.

SIX RHODE ISLAND REDS PLACED ON LIMITED RUN.

—	Oct. 7.	Oct. 14.	Oct. 21.	Oct. 28.	Nov. 4.	Nov. 11.
No. 16	4	4·14	5·12	6	5·14	6
" 14	4·4½	5·6½	6	6·6	6·14½	6·14
" 25	5·3½	6	5·2	5·14½	6·7½	6·7½
" 27	3·12	4·7½	4·12½	4·15½	4·15½	5
" 39	4·7½	5·2	4·12½	5·4½	5·3½	5·8
" 8	4·12	5·10½	5·11½	6	6·3½	6·5

A THREE MONTHS OLD CHICKEN WANTED.

The large poultry purchasing companies in Canada call for a three months old chicken as being best suited to the wants of a certain class of customers in our home and the English markets. The chickens are wanted early and in numbers. There should be no difficulty in our farmers having such chickens by end of July or beginning of August. A fear has been expressed that a chicken of this age will not have weight. The following is the best answer. It is a result that has been attained in our department for many years, and not only by us but by many farmers:—

Barred P. Rock Cockerel, hatched 10th May: weight on 10th August, 3 pounds.

White P. Rock Cockerel, hatched 10th May: weight on 10th August, 3 pounds.

Barred P. Rock Cockerel, hatched 17th April ; weighed on 17th July, 3 pounds 6 oz.

White Wyandotte Cockerel, hatched 17th April; weight on 17th July, 3 pounds 5 ounces.

White Wyandotte Cockerel, hatched 17th April; weight on 17th July, 3 pounds 4 ounces.

L. Brahma P. R. Cross-Cockerel, hatched 17th May; weight on 19th August, 3 pounds 9 ounces.

L. Brahma P. R. Cross-Cockerel, hatched 17th May; weight on 19th August, 3 pounds 10 ounces.

COMPOSITION OF FARM RATIONS AND MANNER OF FEEDING THEM.

The composition of the farm rations at present being fed, with the view of egg production, is much the same as those of previous years, but the time of feeding slightly differs. Last year mash was fed to the hens in the morning three times per week. On the remaining mornings cut green bones were given instead. At noon a light feed of oats, and at night whole grain. The pullets received mash twice per day in small quantities, and cut bone three times per week, with whole grain for afternoon ration.

When cut bone was given the mash was not fed. But this treatment was found too fattening for the Plymouth Rock pullets, and the rations and times of feeding them were made the same as with the older stock.

The rations this year are fed as follows:—

To 110 Hens, One to Two Years Old.—In morning, 8 pounds wheat. Noon, 5 pounds ground grains (measured dry) made into mash. Afternoon, 8 pounds wheat or buckwheat. Three times per week 8 pounds cut bone are given in lieu of the mash. Mangels regularly given and pure water, grit and ground oyster shells are in abundant supply. Sometimes steamed lawn clippings take the place of the mangels. The ground grains for the mash are 2 pounds coarse ground oats, 2 pounds cornmeal, 1 pound shorts.

The reason for feeding the whole grain in the morning is that scattered in the litter on the floors of the pens, the hens start at once to search for it, and exercise is so induced. The whole grain in the afternoon is calculated to send the fowls to roost with their crops fairly well filled.

To 150 Pullets of Different Ages.—Morning ration 10 pounds grain, principally wheat. Noon, 10 pounds mash. Afternoon, 10 pounds grain. Three times per week 10 pounds of cut green bones take the place of the mash. The ground grains composing the mash are: Cornmeal, 5 pounds; coarsely ground oats, 3 pounds; shorts, 2 pounds.

The essentials such as roots, grit, oyster shells and pure water are in regular supply. The reason for adopting the above method of feeding the pullets is the same as in the case of the hens.

COST OF RATIONS.

Every effort has been made to have the rations as cheap and effective as possible. All kinds of feed are, at time of writing, and have been for some months exceptionally high and in sympathy therewith the price of eggs and poultry has risen above the average of previous years. Calculating at present values, the price of the rations is put as follows:—

RATIONS FOR 110 HENS FOUR TIMES PER WEEK.

	Cts.
16 pounds wheat at 75 cents per bushel	20
5 pounds ground grains for mash	6
Lime, grit, mangels, &c	3
	29

OTHER DAYS.

16 pounds wheat	20
8 pounds cut green bone at 1 cent per pound	8
Lime, grit and mangels	3
	31

RATIONS FOR 150 PULLETS FOUR TIMES PER WEEK.

20 pounds wheat	25
10 pounds mash	12
Lime, grit and mangels	37

When mash is not fed on remaining three days it is replaced by 10 pounds cut green bone at 1 cent per pound, 10 cents.

To the price of the cut bone is to be added the cost of cutting it, which would be the time of a man for an hour three times per week.

WHEN THE PULLETS BEGAN TO LAY.

The pullets hatched in incubator on 26th February, laid as follows:—

1 Brown Leghorn pullet (4 months 20 days old), July 17, 1901.
2 White P. Rock pullets (5 months of age), July 28, 1901.
1 Cross-bred pullet (5 months of age), July 28, 1901.
1 White P. Rock pullet (5 months 3 days old), August 1, 1901.

Other pullets laid at the following dates:—

Buff Leghorn, hatched 23rd June; 21st November.
Rhode Island Red, hatched in May; 25th November.
Langshan, hatched in April; 1st December.
White Wyandotte, hatched in May; 2nd December.
B. P. Rock, hatched in May; 3rd December.
White Leghorn, hatched 4th June; 7th December.

In August last, 4 Buff Orpington and 4 Faverolle pullets were imported from England. On September 2, the month following one of the Buff Orpington pullets, laid and continued to do so until the 13th of the same month when she became broody, but was broken up. The pullets were evidently early hatched, and it is quite possible that she may have been laying before leaving England.

On the 9th September, a Faverolle pullet laid apparently her first egg.

DID THE EARLY HATCHED PULLETS MOULT?

The early incubator farm hatched chickens (26th February) did moult in the fall, and while doing so ceased laying. The cross-bred pullet laid but a few eggs when it became broody, but was put in a pen by herself and broken up. The imported Orpington pullets, although apparently early hatched, did not moult. The Faverolle pullets began to moult on going into winter quarters. Further experience is required before a decision can be arrived at as to whether the early incubator-hatched pullets are better for fall layers, when the majority of hens are moulting, than late April or early May-hatched birds. If the early incubator-hatched pullet begins to lay in July or August, when eggs are cheap, and commences to moult in October or November, when the price of eggs is becoming higher, the later May-hatched chicken, which usually begins to lay in November and continues to do so without stoppage, is the more valuable bird of the two. But this remains yet to be decidedly proved. On this point the experience of those who have had early hatched-incubator chickens would be very acceptable and useful. It is a matter of no little importance.

GOOD LAYING BY THE BUFF ORPINGTON PULLETS.

During the fall months the Orpington pullets, with one exception, laid from time to time and were not pushed to do so. The exception was a pullet which had evidently become sick on the voyage out, for she had incipient roup on her arrival at our poultry department. She was at once separated from the rest, and with care and treatment was brought to comparatively good condition. She was put with the others in the second week of December, and soon after began to lay.

The record of three pullets for the first half of the month of December, and of the four for the latter portion is as follows:—

—	—																													Total.
Days of the month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
No. of eggs laid by 4 Buff Orpington pullets in Dec., 1901.....	2	3	1	3	2	2	2	3	2	1	1	2	2	2	2	2	2	2	2	2	2	1	3	3	2	2	4	4	2	1	3	67

AN EARLY MOULT—COMMENCEMENT OF WINTER LAYING.

The one and two-year old hens moulted early, and went into winter quarters in good condition. Winter laying commenced on the 23rd of November. At that time the weather had turned cold and there was a snow fall which necessitated the closing in of the different pens for the winter.

Every effort was made to shorten the moulting period, which is really one of non-production, and gratifying success was attained. The following treatment was adopted. During the first week in July the sending out of eggs for hatching purposes had ceased, and the breeding pens were broken up, the male birds being removed to a building with small pens and limited runs. The hens were allowed to run in small fields in rear of the poultry buildings. During the first two or three weeks in July their rations were reduced one-half, the mash being fed only once per week, and one-half in quantity. At end of July the full rations were resumed, and the mash was fed three times per week, but was mixed with cold instead of hot water. As it was not convenient or desirable to feed cut bone during the hot weather of August, a preparation of meat (Spratt's Crissell) was mixed in the mash, in the proportion of 3 to 5 pounds per hundred hens. The half rations were ½ pound wheat or buckwheat to every 15 hens of the Mediterranean classes, and to every 20 hens of the heavier breeds. When buckwheat is used in summer it is better to mix oats with it. The half ration of mash was fed in the same proportions. Bran was used as a part of the mash. The full ration of mash was composed of coarsely ground oats, 2 parts; shorts, 1 part; cornmeal, 1 part, with Spratt's Crissell in quantity of one pound to every 15 or 20 hens. Pure water for drink was always at hand. The fields furnished clover and grass. The response to this treatment was the shedding of the old feathers and the appearance of the new ones. By the end of September or first week in October, some much earlier, the hens were over their moult and looking remarkably well. From the results obtained and observation during the moult it seemed as if it were possible to shorten the season of non-production to a still greater extent. One result in the shortening of the rations was to at once reduce the egg production to almost nothing. The remarks of Dr. N. W. Sanborn, a recognized authority of the United States, in his work on 'Poultry Diseases,' says of the moulting period: 'So many birds pass through the moulting process with difficulty, if not disease, that it is well to call attention to it. A moulting hen is easily fattened. Hence, at this period, feed lightly of those foods which produce fat. Corn, cornmeal, middlings, potatoes, must be used sparingly. Increase the amount of green bone, bran and skim milk. A run in a field of clover will be a help. Do not try to hasten the time of the moult by keeping in a warm pen or by feeding cotton seed or linseed meal. Keep all males by themselves during the moulting season. The hens should be sheltered from storms or cold rains. The ideal place for a run is an apple orchard where in addition to the grass may be found insects in fallen fruit, &c. Birds should go into the moult not fat, free from lice and with no red mites in the house.' This extract was given in report of 1896, but is valuable enough to warrant its repetition.

RED MITES. AN INQUIRY AND REPLY.

The following note and answer will convey information that will doubtless be useful to many poultry keepers:—

'ELGIN, ONT., December 23, 1901.

'Manager Poultry Dept.,
'Experimental Farm, Ottawa.

'SIR,—Will you be kind enough to tell me what will get rid of lice on hens and in their house? In the summer the house and roosts swarmed with little insects that could scarcely be seen. And they are still in the house. If I go in I am covered with them. I have used a good deal of stuff, but cannot get rid of them. Hoping to get a remedy for them.

'J. J. K.'

A reply was sent that the fowls should be carefully dusted with carbolic powder. If the fowls were in large numbers one of the liquid preparations was advised as the most speedy way in which to meet the difficulty. These liquid lice-destroying preparations have, in recent years, been put upon the market and are said to be efficient. For red mites the following remedy was advised:—A solution of

Corrosive sublimate	4 ounces.
Common salt	4 "

Dissolve in two to four quarts of water. When completely dissolved dilute to 25 gallons.

With this carefully spray every crevice, nook and corner of the house.

As the solution is highly poisonous, care should be observed in handling it.

Follow by whitewashing the premises. Before returning the fowls to the poultry-house see that they are entirely free from vermin. This treatment has been found efficacious in many cases, and is the quickest and surest method of getting rid of the troublesome pests. A good plan to prevent the lodgment of lice on the roosting places and platforms is to dampen both roosts and platforms once every ten or fourteen days with coal oil. Scaly leg will also be prevented.

DISEASES OF POULTRY.

Symptoms of many diseases of poultry were described and remedies asked for during the year. Many of the ailments were forms of liver affection due to overfeeding and lack of exercise, particularly in the case of two and three-year old hens of the heavier breeds. A liver pill and a change in the manner of feeding the rations and quantity fed were advised. Many cases of cold and slight catarrh were also reported. In such cases the removal of the cause, if apparent, was advised with the use of a good condition powder and roup pills, when easily procured. Coal oil in the incipient stages is recommended.

STOCK ON HAND IN DECEMBER.

Breeds.	Hens.	Pullets.	Cocks.	Cockerels.
Barred P. Rocks	10	30	1	12
White "	8	14	.....	4
Buff P. Rocks	.....	7	.....	1
White Wyandottes	10	18	1	15
Langshans	10	6	1	2
Light Brahmas	.....	.....	1	
Faverolles	.....	4	.....	1
Buff Orpingtons	.....	4	.....	2
Brown Leghorns	8	6	1	2
White "	4	10	1	6
Buff "	14	12	1	3
Andalusians	8	.....	1	1
Black Minorcas	8	3	1	
White Indian Games	6	.....	1	
White Minorcas	5	.....	1	
Rhode Island Reds	.....	7	.....	4
L. Brs.-P. Rock Cross	3	15	.....	1
Mixed Fowls	19			
	113	136	11	54

Eggs laid by different breeds from December 1, 1901, to June 30, 1902.

Breeds.	1900.	1901.						Totals.	Remarks.
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.		
10 W. Leghorn hens	24	38	34	70	135	141	73	515	
10 B. Minorca hens	61	96	120	145	135	100	65	722	
5 " pullets	.....	36	68	73	76	38	65	356	
9 Andalusian hens	2	34	53	83	115	104	87	478	
15 Brown Leghorn hens	39	87	101	168	192	207	129	923	
7 Langshan hens	5	68	70	79	67	40	21	350	As the season advanced the hens of the setting breeds became broody and were given eggs, or broken up.
7 " pullets	10	71	47	64	81	87	34	394	
11 B. P. Rock hens	35	35	48	85	87	73	65	428	
20 " pullets	80	299	312	281	218	141	45	1,376	
8 W. P. Rock hens	38	74	68	82	94	98	49	503	
6 " pullets	5	44	59	64	67	57	53	349	
4 W. Wyandotte hens	35	63	56	54	5	Broody.		213	
12 " pullets	5	68	124	129	157	75	56	614	
6 W. Minorca hens	13	51	43	61	69	55	54	346	
6 Buff Leghorn hens	47	61	56	74	80	60	45	423	
10 " pullets	55	81	94	90	110	62	57	549	
14 Mixed hens	55	82	133	189	189	118	90	856	These hens were mostly first crosses.
11 " pullets	12	90	130	144	216	174	105	871	
8 White Ind. Game hens	30	52	34	109	110	53	75	463	
	551	1,430	1,650	2,044	2,203	1,683	1,168	10,729	

Number of Eggs Laid from December 1, 1900, to November 30, 1901.

1900.

December	551

1901.

January	1,430
February	1,650
March	2,005
April	2,126
May	1,711
June	1,134
July	465
August	335
September	181
October	222
November	198
	12,008

Experiments in preserving eggs, by Mr. F. T. Shutt, Chemist of the Experimental Farms, have been continued during the past season, and a report made by Mr. Shutt on this subject will be found appended.

Ottawa, December 28, 1901.

The Preservation of Eggs by Frank T. Shutt, M.A.,

Chemist, Dominion Experimental Farms.

The results of the experiments in egg preservation commenced in 1898 and continued in 1899 and 1900, have already been published in the annual reports of the Experimental Farms. They go to show that of all the preservative fluids and methods used none gave such uniformly satisfactory results, as regards quality of the preserved egg, as saturated lime-water, and, further, that this was the least expensive and most pleasant to handle of all the fluids employed.

Further trials have been made during the past season, using (1) lime-water, (2) lime-water containing 1 per cent common salt, (3) lime-water containing 2 per cent common salt, (4) common salt, 1 per cent, (5) common salt, 2 per cent. We also tested the efficacy of the following methods:—(6) smearing the eggs with vaseline and (*a*) immersed in lime-water, and (*b*) set away in rack, (7) covered with paraffin and immersed in lime-water, and (8) dipping in saturated solution of potassium permanganate and set away in rack, (9) sodium aluminate, 5 per cent solution. The experiments began May 14, 1901, and the eggs were examined on December 14, 1901, a period of 7 months.

Saturated Lime-water.—'White,' somewhat more limpid than in fresh egg and tinged faintly yellow. Yolk, globular, and in one or two eggs, attached to shell. No offensive smell, and appearance, both externally and internally, good. Discoloration of 'white' somewhat more pronounced on poaching with development of very faint musty odour. Though not equal to fresh egg in flavour, they are quite usable and in no degree offensive.

Saturated Lime-water, containing 1 per cent common salt.—Very good as to appearance, both externally and internally; 'white,' very slightly tinged, but a little more limpid than in saturated lime-water alone. Yolk, globular; air-space, normal. Faint odour, somewhat more strongly marked on poaching. Nothing disagreeable in uncooked or cooked egg; quite usable, but lacking the flavour of a fresh egg. Compared with eggs in saturated lime-water only, they are on the whole perhaps slightly superior.

Saturated Lime-water and 2 per cent common salt.—'White,' quite limpid and slightly brownish. Fairly well preserved, but not equal to eggs in either of the foregoing liquids.

Common salt, 1 per cent solution.—In appearance, both externally and internally, four of the eggs were very similar to those kept in lime-water, but they possessed a more marked musty odour. In two of the eggs the 'white' was limpid and yellowish, the yolk had lost its globular form, and the smell was disagreeable.

Common salt, 2 per cent solution.—'White,' very limpid. Yolk, reddish-black and of the consistency of jelly; very bad smell. All the eggs were quite spoilt and unusable.

Eggs smeared with vaseline and kept in lime-water.—'White,' more markedly discoloured than those in lime-water simply; musty smell, somewhat inferior to eggs kept in lime-water without vaseline covering.

Eggs smeared with vaseline and kept in rack.—'White,' slightly discoloured; possesses faint musty odour, but fairly good; apparently somewhat better than eggs in preceding test.

Eggs covered with paraffin and kept in lime-water.—'White,' slightly tinged with yellow; yolk, thin and degraded in one or two of the eggs; musty smell. Eggs decidedly inferior to those in lime-water simply. External appearance rough and unattractive, due to paraffin.

Eggs dipped for half a minute in saturated permanganate of potash solution, and kept in rack.—Eggs considerably dried in, air-space abnormally large, showing the 'white' very limpid and quite discoloured; very musty odour. The majority of the eggs were considered as decidedly bad and unfit for use.

Sodium aluminate, 5 per cent solution.—'White,' slightly tinged; general appearance, good; faint musty odour.

CONCLUSIONS.

The preservative solutions that gave the best results were lime-water and the lime-water containing 1 per cent salt. There was not much difference between the eggs, cooked or uncooked, to sight, smell or taste, kept in these two solutions, but such as there was, we considered, showed the eggs in the latter to be slightly the better.

The addition of salt to the lime-water to an extent exceeding 1 per cent would appear to be no advantage; indeed, when the salt present amounted to 2 per cent we noticed that the quality of the preserved eggs had suffered. The 1 per cent solution is prepared by dissolving 1½ ounces of common salt in each gallon of the saturated lime-water.

The common salt solutions without lime, both 1 per cent and 2 per cent, caused the eggs to have a more marked and disagreeable odour, especially on cooking. All the eggs in the 2 per cent fluid were unusable.

Vaseline-covered eggs were not quite as well preserved as those simply in lime-water.

The paraffin-covered eggs were decidedly inferior to those simply preserved by lime-water.

The eggs dipped in a solution of permanganate of potash were decidedly bad, showing that the claims for this much vaunted chemical are without foundation.

In summing up the conclusions from the work of 1901, we feel justified in repeating the statement that saturated lime-water is a most effective preservative. We can further say that it is a cheap, easily prepared and pleasant fluid to handle. The addition of a small amount of salt (not exceeding 1 per cent) appears to be an advantage, but a larger amount—even 2 per cent—of salt is decidedly detrimental to the quality of the preserved eggs.

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES

REPORT OF R. ROBERTSON, SUPERINTENDENT.

Nappan, N.S., November 30, 1901.

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith my third annual report, it being the fourteenth annual report of operations on the Experimental Farm for the maritime provinces at Nappan, N.S.

The season was not favourable for the majority of crops, although especially favourable for hay and corn. The early wet spring benefited the hay crop, which was good, especially on the upland.

The early grain was quite promising until toward reaping time, when the continuous warm dry weather caused it to ripen prematurely; the result being that most of the grain was light per bushel, and did not yield nearly as many bushels as was expected. The late sown grain was extremely poor. Roots were a fair crop. The field corn was the best we have ever had. The warm weather was extremely favourable for this crop, which matured well.

The catch of clover was fairly good, but has made nothing like the usual growth.

The after grass was very poor, and as a result all cattle in this section are very much thinner in flesh than they have been at the same period during the last four years.

About the usual number of people visited the farm this year. The largest excursion for the season was from Fox Creek, N.B., on July 20. Many smaller groups or picnics, of from 20 to 100, came from time to time during the summer.

I again wish to acknowledge the valuable services of Mr. Thomas Coates, farm foreman, who kept records of all grain experiments, and took charge of general farm work, and of Mr. Robert Donaldson, herdsman, under whose charge all the experiments with stock were carried on.

WEATHER.

December commenced quite cold, moderating, however, on the 4th, with a drifting snow storm on the 5th. This made very good sleighing, which continued for the winter.

The thermometer registered 3° below zero on the 9th, and continued below zero until the 12th, when 12° below zero was reached. It soon moderated somewhat, and on the 14th we had another snow storm which made good roads.

The thermometer again went below zero on the 16th, and on the 18th 11° below zero was reached.

The month from this time out was not very cold, with the exception of the 28th, when zero was again reached.

The 2nd and 3rd of January, registered 2° and 6° below zero respectively. It kept quite cold and fine until the 12th and 13th, when a heavy drifting snow storm made it necessary to break out roads, which were drifted full in many places. The mercury

fell to zero on the 14th, and 9° below on the 15th, 6° below on the 19th, and 10° below on the 23rd. The weather was again fine until the 25th, when it came in mild, with rain on the 26th and 27th, turning cold again, however, and continuing so until the end of the month.

There was a heavy fall of snow on the 3rd of February, which made road breaking again necessary, and on the 8th another snow storm blocked the roads. With one exception the balance of the month was fine and moderate, but the temperature fell to 3° below zero on the 23rd, followed with moderate weather and a heavy storm on the 24th, which again drifted the roads full of snow.

March started fine but cold, moderating somewhat until the 7th, when the thermometer fell to 10° below zero. It soon moderated again, and on the 9th snow, followed with some rain and wind, which soon took off much snow. The remainder of the month was fairly moderate, taking off the snow gradually; and on the 22nd a heavy warm rain with wind took off most of what remained, and broke up sleighing. The weather continued open, and another rain followed on the 28th.

April opened fine with no very cold weather. It rained on the 5th, and again on the 11th, after which fine dry weather continued. On the 19th some seeding was done, but it set in wet on the 22nd, the weather being broken until the 26th; the balance of the month being fine.

May commenced fine with cold weather on the 2nd, when the last spring frost was recorded of 6°. The 4th was wet, and it continued dull until the 8th, when fine weather was broken by a rain on the 13th. It continued fine again until the 23rd, after which the month was broken and dull. No very great amount of rain fell during this month, but enough to retard seeding operations very much, and while the spring was early, yet the majority of the crops were late sown on account of the continuous dull weather.

June opened dull, but there was very fair weather the greater part of the month, with slight rains on the 2nd, 10th, 13th and 24th. The thermometer registered 81°, 83° and 80° on the 26th, 27th and 29th respectively.

July was exceptionally fine and dry, having only slight showers on the 8th and 15th. The mercury was up to 81°, 80°, 81°, 86°, 85°, 82°, 80° and 82° as the highest on the 12th, 13th, 14th, 15th, 16th, 18th, 22nd and 23rd respectively.

August was fine, with the exception of dull weather and light showers on the 6th, 9th and 10th. The temperature was up to 83°, 80°, 84°, 81°, 80° and 81° on the 1st, 6th, 7th, 24th, 28th and 30th respectively. The summer months were more continuously warm than usual, with no very extreme heat. The dry weather continued through August, affecting the crops very much.

September commenced fine, but dull weather and occasional showers continued after the first week until the 19th, when the first heavy rain of the season fell. This materially helped the crops still growing. The weather continued broken for three days, after which the month was fine. A temperature of 83° and 85° is recorded for the 6th and 7th respectively. This month throughout was unusually warm.

October commenced fine, but broken weather on the 3rd was followed by fine weather until the 18th and 19th, when it was again wet until the 26th. The remainder of the month was fine. The first frost of the season to strike here was on the 8th October, the thermometer registering then 1°, and on the 22nd 10° of frost is recorded. The weather was then moderate until the 28th, when the mercury again fell below freezing.

The first of November was fine, with snow and some rain on the 10th. It kept fine, with occasional frosts until the 25th, when we had a heavy rain and wind storm, followed by cold weather.

METEOROLOGICAL RECORD.

Maximum and minimum thermometrical observations for the year beginning with December 1, 1900, and ending November 30, 1901.

Month.	Maximum.	Minimum.
December, 1900	31st 39° above zero	18th 11° below zero.
January, 1901	23rd and 26th 39° above zero	23rd 16° "
February "	26th 36° above zero	23rd 3° "
March "	26th 45° "	7th 10° "
April "	19th and 28th 64° above zero	3rd 23° above zero.
May "	22nd 75° above zero	2nd 26° "
June "	27th 83° "	16th 35° "
July "	15th 86° "	25th 39° "
August "	7th 84° "	22nd 40° "
September "	7th 85° "	20th 33° "
October "	13th 68° "	22nd and 29th 22° above zero.
November "	1st 62° "	24th 9° above zero.

EXPERIMENTS WITH OATS.

Sixty-four varieties of oats were sown in uniform plots of one-fortieth acre each on May 1. The soil was a clay loam, and was previously in mangels, having been manured for that crop with 30 one-horse cart loads of manure per acre, which was put on in the spring of 1900, and to which 200 pounds of complete fertilizer was added before the rows were run up for the crop. The land was ploughed after the mangel crop was removed in the fall of 1900, and this spring was worked up by going over it twice with the spring-tooth harrow and once with the smoothing harrow. No fertilizer of any kind was used for the grain crop.

The seed was sown at the rate of 2½ bushels per acre with the Wisner seed drill. The field was seeded down to clover and timothy at the rate of 3 pounds of alsike, 7 pounds mammoth red clover and 12 pounds timothy seed per acre. This seed was sown with an attachment to the seeder at the same time the grain was sown. The crop of straw was generally good, and stood up well. It was bright and free from rust. The majority of the plots had some smutty heads in them, but none were badly affected. The results obtained from this test are given in the following table :—

OATS—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Cream Egyptian	Aug. 16	107	45	Stiff	7 to 9	Sided	5,200	76	16	40
Cromwell	" 22	113	48	"	6 " 9	"	6,000	74	4	36
Rosedale	" 10	101	46	"	6 " 9	"	5,000	71	26	40
Abyssinia	" 17	108	47	"	6 " 9	"	5,480	68	8	40
American Beauty	" 18	109	45	"	6 " 8	Branching	4,800	68	8	37
Oderbruch	" 16	107	46	Medium	6 " 8	Sided	5,000	68	8	38
White Schonen	" 15	106	44	Stiff	6 " 8	Branching	5,000	68	8	34
Early Golden Prolific	" 10	101	46	"	7 " 9	"	4,400	67	2	35
Flying Scotchman	" 10	101	46	Medium	6 " 9	"	5,000	67	2	40
Black Mesdag	" 6	97	45	Stiff	6 " 8	"	4,600	65	30	34
Black Beauty	" 9	100	44	"	7 " 10	"	5,000	65	30	34
Siberian	" 18	109	44	"	6 " 8	"	4,200	65	30	35
Improved American	" 18	109	48	"	7 " 9	"	4,800	65	30	36
Bavarian	" 18	109	46	"	7 " 9	"	5,000	65	30	37
Lincoln	" 18	109	45	"	6 " 8	"	4,800	64	24	37
Pense	" 16	107	45	"	7 " 9	Sided	4,800	64	24	37
Hazlett's Seizure	" 10	101	46	"	6 " 9	Branching	4,600	63	18	39
Prolific Black Tartarian	" 18	109	46	"	6 " 9	Sided	5,400	63	18	35
Mennonite	" 18	108	45	"	6 " 8	Branching	4,400	63	18	34
White Giant	" 16	107	44	"	6 " 8	"	4,280	63	18	36
Newmarket	" 18	109	45	Medium	7 " 9	"	5,000	63	18	36

OATS—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Banner	Aug. 16..	107	43	Stiff.....	6 to 8	Branching..	5,000	63	18	36
Early Blossom	" 16..	107	46	"	6 " 8	Sided.....	5,000	62	12	40
White Russian	" 14..	105	44	Medium.	7 " 9	Branching..	4,600	62	12	37
Abundance	" 16..	107	43	Stiff	7 " 9	" ..	4,600	62	12	35
Joanette	" 10..	101	43	Medium..	6 " 9	" ..	4,500	62	12	35
Buckbee's Illinois	" 18..	109	46	Stiff. ...	6 " 8	" ..	5,000	62	12	37
Early Maine	" 17..	108	45	"	6 " 8	" ..	4,680	62	12	36
Bonanza	" 10.	101	46	"	7 "10	" ..	4,500	61	6	36½
Wallis	" 18..	109	43	"	6 " 8	" ..	4,280	61	6	37
Kendal	" 16..	107	46	"	7 " 9	Sided.....	5,000	61	6	36
Early Archangel	" 8..	99	45	"	7 " 9	Branching..	4,200	60	..	40
Improved Ligowo	" 15..	106	45	"	6 " 8	" ..	4,600	60	..	38
Thousand Dollar	" 16..	107	46	"	6 " 8	" ..	4,600	60	..	38
Golden Beauty	" 18..	109	45	Medium..	6 " 8	" ..	4,200	60	..	36
Milford	" 16..	107	46	Stiff. ..	6 " 9	Sided.....	4,400	60	..	39
Tartar King	" 10..	101	46	"	7 " 9	"	5,000	60	..	37
Golden Tartarian	" 22..	113	45	"	7 "10	" .. .	4,800	60	..	35
Sensation	" 11..	102	44	"	6 " 9	Branching..	3,800	58	28	36
Early Gothland	" 16..	107	46	"	7 " 9	Sided.....	4,200	58	28	38
California Prolific Black	" 18..	109	47	"	6 " 9	"	5,000	58	28	35
Scotch Potato	" 16..	107	40	"	6 " 8	Branching..	4,200	58	28	38½
Olive	" 16..	107	43	"	7 " 9	Sided.....	4,800	58	28	36
American Triumph	" 22..	113	46	"	6 " 9	Branching..	6,000	58	28	39
Golden Giant	" 22..	113	45	"	6 " 8	Sided.	5,000	57	22	37
Irish Victor	" 15..	106	42	"	7 " 9	Branching..	4,400	57	22	34
Danish Island	" 18..	109	45	"	6 " 8	" ..	4,600	57	22	36
Holstein Prolific	" 15..	106	46	Medium..	6 " 9	" ..	4,200	57	22	37
Pioneer	" 18..	109	44	" ..	6 " 8	" ..	4,200	57	22	38
Wide Awake	" 18..	109	44	Stiff.....	6 " 8	" ..	4,200	56	16	38
Salzer's Big 4	" 14..	105	42	"	6 " 8	" ..	4,200	56	16	35
Miller	" 18..	109	43	"	6 " 8	" ..	4,600	56	16	38
Goldfinder	" 18..	109	42	"	6 " 8	Sided.	4,200	55	10	35
Columbus	" 18..	109	43	Medium..	6 " 8	Branching..	3,800	55	10	36
King	" 16..	107	46	Stiff	6 " 8	" ..	4,200	54	4	38
Oxford	" 18..	109	45	Medium .	6 " 8	" ..	4,400	51	26	40
Waverley	" 16..	107	44	Stiff.....	6 " 9	" ..	4,280	51	26	38
New Zealand	" 22.	113	46	"	7 " 9	Sided.....	5,000	49	14	37
Brandon	" 18..	109	46	"	6 " 9	Half Sided..	3,800	48	8	38½
Holland	" 18..	109	42	Medium..	6 " 8	" ..	4,200	47	2	38
Master	" 18..	109	45	" ..	6 " 9	Branching..	4,200	47	2	38½
Russell	" 18..	109	46	Stiff	6 " 9	Half Sided .	4,200	47	2	38½
Longhoughton	" 18..	109	42	"	7 " 9	Branching..	3,800	44	24	39
Salines	" 17..	108	46	"	6 " 8	" ..	4,400	44	24	35

EXPERIMENTS WITH BARLEY.

The different varieties of barley were sown May 11. The soil was of a clay loam character, and was previously in corn. It was manured for this crop in the spring of 1900, with 30 one-horse cart loads of stable manure per acre. After the corn crop was removed in the fall of 1900, it was ploughed, and before seeding to grain this spring it was worked up by going over it twice with the springtooth and once with the smoothing harrows.

Thirty varieties of six-rowed and twenty-two varieties of two-rowed sorts were sown. The seed was sown with the Wisner seed drill at the rate of two bushels per acre. The land was also seeded down to timothy and clover at the rate of 3 pounds alsike, 7 pounds mammoth red clover, and 12 pounds timothy per acre. No fertilizers of any sort were used with this grain. The plots were one-fortieth acre each.

The majority of the plots had smut in them, but in every case the injury from this cause was slight. The straw was stiff, and stood up well. It was free from rust. The following results were obtained from these test plots :—

BARLEY, SIX-ROWED—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
Common	August 5.	86	44	Medium	1½ to 2	5,880	64	8	48
Oderbruch	" 7.	88	43	"	1½ " 2½	5,400	61	32	49
Odessa	" 7.	88	44	Stiff	1½ " 2½	5,080	60	..	48
Baxter	" 7.	88	44	"	2 " 3	5,520	59	8	49
Mensury	" 7.	88	42	"	2 " 3	4,000	56	32	48
Claude	" 7.	88	46	"	2 " 2½	5,690	52	24	49
Hulless Black	" 5.	86	34	Medium	2	5,400	50	40	61
Yale	" 12.	93	44	"	2	4,800	50	40	47
Albert	" 5.	86	40	Stiff	2 " 3	4,600	50	..	49
Excelsior	" 5.	86	48	Medium	2 " 3	5,080	50	..	40
Success	" 5.	86	41	"	2 " 2½	4,600	49	8	40
Argyle	" 7.	88	43	Stiff	2 " 3	4,400	48	16	48
Champion	" 5.	86	46	Medium	2 " 3	4,400	47	24	37
Vanguard	" 8.	89	44	Stiff	2 " 2½	4,600	47	24	48
Nugent	" 8.	89	41	"	2 " 3	4,000	47	24	48
Hulless White	" 5.	86	36	Medium	2 " 2½	5,000	46	32	59
Petschora	" 7.	88	44	Stiff	2 " 2½	3,600	46	32	47
Empire	" 8.	89	45	Medium	2 " 2½	3,480	46	32	48
Rennie's Improved	" 6.	87	45	Stiff	1½ " 2	3,480	46	32	48
Garfield	" 7.	88	46	"	2 " 2½	4,600	45	40	49½
Brome	" 12.	93	43	Medium	2 " 3	4,000	45	..	48
Pioneer	" 7.	88	43	Stiff	1½ " 2½	4,400	44	8	49
Phoenix	" 7.	88	43	"	1½ " 2	4,400	42	44	49
Trooper	" 10.	91	40	"	2 " 2½	4,000	41	32	48
Royal	" 8.	89	40	"	2 " 2½	4,000	41	32	47
Summit	" 15.	96	43	"	2 " 2½	4,000	40	40	49
Surprise	" 15.	96	42	"	2 " 2½	4,000	40	..	48
Mansfield	" 12.	93	42	"	2 " 2½	3,600	40	..	46
Stella	" 15.	96	42	"	2 " 2½	3,400	38	16	49
Blue Long Head	" 8.	89	40	"	2 " 3	4,000	38	16	43

BARLEY, TWO-ROWED—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.		Inches.	Lbs.	Bush.	Lbs.	Lbs.
Beaver	Aug. 10..	91	40	Medium	2 to 4	5,800	56	32	50
French Chevalier	" 14..	95	42	"	2 " 4	5,000	52	24	50
Bolton	" 10..	91	41	Stiff	2 " 3	4,800	45	..	50
Newton	" 15.	96	41	"	2 " 3	4,080	45	..	50
Standwell	" 15..	96	42	Medium	2 " 3	3,600	45	..	48
Canadian Thorpe	" 15..	96	42	Stiff	2 " 3	5,200	44	8	49
Prize Prolific	" 14..	95	36	"	2 " 3½	4,000	42	24	49
Kirby	" 8..	89	43	"	2 " 3	4,200	40	40	49
Leslie	" 15..	96	42	"	2 " 3	4,600	39	8	48
Sidney	" 15..	96	41	"	2 " 3	3,800	38	16	50
Danish Chevalier	" 15..	96	38	Medium	3 " 4	3,200	38	16	49
Nepean	" 15..	96	44	Stiff	2 " 3	4,600	37	24	49
Harvey	" 15..	96	42	"	2 " 3	4,400	36	32	49½
Gordon	" 14 .	95	46	"	2 " 3	4,800	56	32	48
Invincible	" 14..	95	38	"	2 " 3	4,600	35	40	49
Logan	" 15..	96	46	"	2 " 3	3,880	35	40	49
Kinver Chevalier	" 15..	96	38	Medium	3 " 4	3,000	33	16	49
Clifford	" 14 .	95	42	Stiff	2 " 3	3,200	33	16	50
Victor	" 15..	96	42	Medium	2 " 3	3,200	30	40	48
Dunham	" 15..	96	43	Stiff	2 " 3	3,800	30	40	48
Fulton	" 15..	96	42	"	2 " 3	3,000	30	..	47
Jarvis	" 14..	95	43	"	3 " 4	3,000	27	24	47

EXPERIMENTS WITH SPRING WHEAT.

The soil on which these experiments were conducted was a clay loam. The previous crop was mangels, and the land received for this crop, 30 one-horse cart loads of manure per acre put on in the spring of 1900, to which was added 200 pounds complete fertilizer per acre. The land was ploughed after the mangel crop was removed, and this spring it was worked up by going over it twice with the springtooth and once with the smoothing harrow.

At the time of seeding 3 pounds alsike, 7 pounds mammoth red clover, and 12 pounds timothy seed per acre was sown with the grain. The seed was sown with the Wisner seed drill, which carries an attachment through which the clover and timothy are sown at the same time. The wheat was sown on April 30, at the rate of $1\frac{3}{4}$ bushels per acre, and no fertilizer of any kind was used. The size of the plots was one-fortieth of an acre each. The straw was bright and practically free from rust. There was no smut whatever. The straw was stiff and none lodged. The grain filled out well considering the dry season. The results obtained from the seventy-one varieties under test are given in the following table:—

WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Roumanian	Aug. 21	113	46	Stiff	2 to 3	Bearded	5,000	40		61½
Weldon	" 21	113	59	"	2 " 3	Beardless	4,810	35	20	60½
Advance	" 17	109	48	"	2 " 3	Bearded	4,800	35	20	60½
Hastings	" 20	112	44	Medium	2 " 3	Beardless	3,600	34	40	60½
Beaudry	" 21	113	46	"	2 " 3	Bearded	4,200	34	40	60
Crown	" 20	112	52	Stiff	2 " 3	"	4,600	34	40	59
Hungarian	" 19	111	47	Medium	3 " 3½	"	4,400	34	..	60
Colorado	" 18	110	48	Stiff	2 " 3	"	4,200	34	..	61½
White Connell	" 21	113	46	"	2 " 3	Beardless	4,400	34	..	60
Norval	" 20	112	47	"	2 " 3	Bearded	4,600	34	..	61
Clyde	" 20	112	50	"	2 " 3	Beardless	4,480	34	..	59
Admiral	" 20	112	50	"	2 " 3	"	4,800	33	20	60
Preston	" 18	110	50	"	3 " 3½	Bearded	4,480	33	20	61
Vernon	" 18	110	46	"	2 " 3	"	3,800	33	20	61
Alpha	" 20	112	52	"	2 " 3	"	5,400	33	20	60
White Russian	" 21	113	50	"	2 " 3	Beardless	4,800	33	20	60
Red Fern	" 19	111	50	"	2 " 3	Bearded	4,800	32	40	60
Plumper	" 19	111	46	Medium	2 " 3	"	4,000	32	40	61
Japanese	" 20	112	46	Stiff	2 " 3	"	4,120	32	40	58
Blair	" 20	112	44	Medium	2 " 3	"	4,120	32	40	60
Mason	" 20	112	46	Stiff	2 " 3	Beardless	3,880	32	..	61
Herisson Bearded	" 19	111	44	Weak	1½ " 2	Bearded	3,800	32	..	60
Harold	" 19	111	45	Medium	2 " 3	"	3,400	30	40	60
Stanley	" 20	112	46	Stiff	2 " 3	Beardless	3,800	30	40	61
Chester	" 20	112	42	"	2 " 3	"	3,440	30	40	60
Rio Grande	" 19	111	50	"	2½ " 4	Bearded	3,720	30	40	60
Monarch	" 21	113	48	"	2 " 3	Beardless	4,280	30	40	60
Byron	" 21	113	42	"	2 " 3	"	4,000	30	..	61
Percy	" 19	111	50	"	2 " 3	"	4,000	30	..	60
Pringle's Champlain	" 18	110	47	Medium	2 " 3	Bearded	3,400	30	..	60
Laurel	" 21	113	48	Stiff	2 " 3½	Beardless	4,120	30	..	59
Campbell's White Chaff	" 18	110	48	"	2 " 3	"	4,800	30	..	61
Red Swedish	" 18	110	48	"	2 " 3½	Bearded	3,8 0	30	..	61
White Fife	" 21	113	48	"	2 " 3	Beardless	4,200	30	..	60
Minnesota No. 163	" 21	113	46	"	2 " 3	Beardless	4,680	30	..	60
" No. 181	" 21	113	47	"	2 " 3	"	4,800	29	20	60
Wellman's Fife	" 21	113	50	"	2 " 3½	"	4,360	28	40	59
Blenheim	" 19	111	50	"	2 " 3½	Bearded	3,720	28	40	59

WHEAT—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Rideau	Aug. 20..	112	46	Stiff	2 to 3	Beardless	4,400	28	40	59
Countess	" 21..	113	47	"	2 " 3	"	3,600	28	40	60
Speltz	" 21..	113	36	Weak	2 " 2¼	Bearded	2,800	28	..	41
Red Fife	" 19..	111	47	Stiff	2 " 3	Beardless	3,400	27	20	60
Australian No. 10	" 26..	118	46	"	2 " 3	"	4,680	27	20	59½
Early Riga	" 15..	107	42	"	2 " 3	"	3,200	26	40	60
Ladoga	" 16..	108	45	"	2 " 3	Bearded	3,800	26	40	60½
Crawford	" 20..	112	45	"	2 " 3	Beardless	3,600	26	40	60
Ebert	" 20..	112	45	"	2 " 3	"	3,600	26	40	60
Fraser	" 19..	111	46	"	2 " 3	Bearded	3,400	26	40	59
Dion's	" 19..	111	48	"	2 " 3	"	3,400	26	40	61
Australian No. 25	" 26..	118	46	"	2 " 3	Beardless	3,580	26	40	59
Dawn	" 19..	111	47	"	2 " 3	"	3,400	26	40	60
Bishop	" 21..	113	46	"	2 " 3	"	3,400	26	..	61
Cassel	" 21..	113	45	"	2 " 2½	"	3,320	26	..	59½
Goose	" 20..	112	47	Medium	2 " 2½	Bearded	3,500	26	..	61½
Progress	" 20..	112	47	Stiff	2 " 3	Beardless	3,400	25	20	60
Huron	" 19..	111	48	"	2 " 2½	Bearded	3,800	25	20	60
Dufferin	" 19..	111	46	"	2 " 3	"	3,400	24	40	60
Angus	" 20..	112	48	"	2 " 3	Beardless	3,400	24	40	60
Cartier	" 20..	112	42	"	2 " 2½	Bearded	2,800	24	40	59½
Beauty	" 19..	111	48	Medium	2 " 2½	Beardless	2,920	24	40	59
Essex	" 21..	113	46	Stiff	2 " 3½	"	2,580	24	40	58½
Australian No. 27	" 26..	118	46	"	2 " 3	"	3,200	24	40	59
" No. 13	" 26..	118	46	"	2 " 3	"	3,400	24	..	59½
Captor	" 21..	113	38	"	2 " 2½	"	3,400	23	20	59
Minnesota No. 169	" 21..	113	46	"	2 " 3	"	3,400	22	40	59
Australian No. 23	" 26..	118	46	"	2 " 3	"	3,000	22	40	59½
Minnesota No. 149	" 21..	113	44	"	2 " 3	"	3,400	22	..	59
Robin's Rust Proof	" 21..	113	46	"	2 " 3½	"	4,400	20	40	60
Australian No. 9	" 26..	118	44	"	2 " 3	"	3,400	20	..	59
" No. 19	" 26..	118	45	"	2 " 3	"	3,080	20	..	59½
Benton	" 21..	113	45	"	2 " 3	"	2,920	20	..	58½

EXPERIMENTS WITH PEASE.

Fifty-seven varieties of pease were sown on one-fortieth acre plots on May 2. The previous crop grown on this land was turnips, which received 18 one-horse cart loads of stable manure, and 200 pounds complete fertilizer per acre. The land was ploughed after the turnip crop was taken off, and this spring was worked up by going over it twice with the springtooth and once with the smoothing harrow.

The soil was a clay loam. No fertilizer was used for this crop. Timothy and clover seed at the rate of 3 pounds alsike, 7 pounds mammoth red clover ,and 12 pounds timothy per acre was sown with the grain.

The pea aphis was not troublesome this season, and has apparently disappeared. The results obtained from these tests are as follows:—

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
				In.	Lbs.	In.		Bush. Lbs.	Lbs.
Arthur	Aug. 22..	112	Strong....	48	5,400	2 to 2½	Medium....	50 ..	62
Pearl	" 31..	121	" ..	36	5,200	2 " 2½	"	50 ..	61
Gregory	" 28..	118	"	50	5,600	2 " 3	"	48 40	61½
Victoria	" 29..	119	"	48	5,600	2 " 3	Large	48 40	60
Pride	" 28..	118	"	50	5,400	2 " 3	Medium....	46 40	61
Elder	" 31..	121	"	45	5,400	2 " 3	"	46 40	61
Bright	" 28..	118	"	48	5,200	2 " 3	Large	46 40	62
Chancellor	" 17..	107	"	48	5,000	1½" 2	Small ...	45 20	62
Fergus	" 31..	121	"	46	5,600	2 " 3	Medium....	45 20	62
Elliot	" 28..	118	"	48	5,600	1½" 2	"	44 40	60
Agnes	" 28..	118	"	50	5,480	2 " 3	"	44 40	62
Crown	" 25..	115	"	43	4,000	1 " 2	Small	44 ..	62
Paragon	" 18..	108	Weak ..	30	3,600	1 " 2	Medium....	43 20	62
Oddfellow	" 23..	118	Strong....	46	4,600	1 " 2	"	43 20	62
Large White Marrowfat	" 28.	118	"	53	4,800	3 " 3½	Large	43 20	62½
Prince Albert	" 27..	117	"	46	5,200	2 " 3	Medium....	43 20	61
Multiplier	" 28..	118	"	48	5,600	2 " 3	"	43 20	62
Herald	" 30..	120	"	48	5,000	2 " 2¼	"	42 40	62
Bruce	" 28..	118	"	48	5,400	2 " 3	Large	42 40	61½
Duke	" 23..	113	"	50	5,000	1½" 2	Medium....	42 40	61
Dover	" 29..	119	"	50	5,000	2 " 3	Large	42 40	63
Kent	" 31..	121	"	50	4,400	2 " 3	"	42 40	61
Wisconsin Blue	" 28..	118	"	44	4,200	2 " 3	Medium....	42 40	62
Macoun	" 28..	118	"	48	4,000	2 " 3	"	42 40	63
Nelson	" 18..	108	"	46	4,400	2 " 3	"	42 40	63
Archer	" 23..	113	" ..	50	4,400	2 " 2½	"	42 ..	63
Picton	" 29..	119	"	46	4,800	2 " 3	"	42 ..	62
Mackay	" 29..	119	" ..	48	5,000	2 " 3½	Large	42 ..	61
Chelsea	" 31..	121	"	48	5,600	2 " 3	"	42 ..	61
New Potter	" 27..	117	"	50	5,600	2 " 3	"	42 ..	61½
White Wonder	" 17..	107	"	35	4,000	2 " 3	Medium....	41 20	62
Cooper	" 23..	113	"	48	4,600	2 " 2½	"	41 20	63
King	" 23..	113	"	48	4,200	2 " 3	"	41 20	61½
Prussian Blue	" 18..	108	"	46	5,000	2 " 2½	"	40 40	63
French Canner	" 28..	118	"	48	5,000	2½" 3	"	40 40	62
Early Britain	" 17..	107	"	50	4,600	1½" 2	Large	40 40	61
Perth	" 21..	111	"	48	4,200	2 " 2½	"	40 40	62
Elephant Blue	" 18..	108	"	50	4,800	2 " 3	Medium....	40 40	62
Golden Vine	" 23..	113	" ..	46	3,800	1 " 2	Small	40 40	62½
German White	" 23..	113	"	52	4,400	2 " 2½	Medium....	40 40	63
Lanark	" 29..	119	"	54	4,400	2 " 3	Large	40 40	61
Creeper	" 17..	107	"	50	4,200	2 " 2½	Small	38 40	63
Daniel O'Rourke	" 25 .	115	"	48	3,720	2 " 2½	Medium....	38 40	63
Prince	" 18..	108	"	43	4,200	1½" 2	"	38 40	62
Harrison's Glory	" 18..	108	"	41	3,800	2 " 3	"	38 ..	62½
Black-eyed Marrowfat	" 27..	117	"	50	4,600	2 " 3	Large	38 ..	62
Trilby	" 29..	119	"	49	4,600	2 " 3	"	37 20	61½
Mummy	" 27..	117	"	50	4,580	2 " 3	Medium....	36 40	62½
Alma	" 18..	108	"	48	4,200	2 " 2½	"	36 40	62
Carleton	" 28..	118	"	40	3,600	1½" 2	Small	36 40	62½
Fenton	" 28..	118	"	42	4,000	2 " 2½	Medium....	36 40	61
English Grey	" 30..	120	"	50	4,200	2 " 3	"	36 40	61
Centennial	" 23..	113	"	51	3,800	2 " 2½	"	35 20	63
Vincent	" 29..	119	"	46	3,880	2 " 3	"	35 20	61
Canadian Beauty	" 22..	112	"	50	4,600	2 " 3	Large	33 20	62
Bedford	" 28..	118	"	48	3,400	2 " 3	Medium....	25 20	63
Grass Pea	" 31..	121	Small ...	36	3,800	1 " 2	Small	22 ..	63

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were under test. These plots were one-fortieth acre each. The land was a clay loam in a very poor state of fertility. The previous crops were grown without stable manure. The land was ploughed in the spring, and worked up twice with the springtooth and once with the smoothing harrow. The seed was sown June 6 with the Wisner seed drill and complete fertilizer at the rate of 100 pounds per acre was drilled in with the seed. The crop was harvested August 30. The warm dry weather seemed to cause this crop to shrink very much, much of the seed not being filled. The following yields per acre were obtained:—

BUCKWHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				Inches.		Lbs.	Bush.	Lbs.	Lbs.
Silver-hull	June 6th.	Aug. 30.	86	36	Stiff.	4,000	16	40	50
Tartarian, or Siberian	"	"	86	37	"	2,280	14	..	48
Grey	"	"	86	35	"	3,400	13	20	48
Rye Buckwheat	"	"	86	39	"	2,600	13	20	49
Japanese	"	"	86	36	"	2,920	12	..	45

EXPERIMENTS WITH FIELD GRAIN.

Six plots of grain of one-half acre each were grown to further test the value of different varieties in field trials. Five of these plots were sown with different sorts of oats, and one with mixed grain made up as follows:—Oats, 2 bushels; barley, 1 bushel; pease, 1 peck, mixed and sown at the rate of 3 bushels per acre.

The land was a light loam, having corn as a previous crop. It was manured for the corn crop in the spring of 1900, with 25 one-horse cart loads of stable manure per acre, and after the corn crop was removed the land was ploughed. This was worked up in the spring time with the springtooth and once with the smoothing harrow. The seed was sown May 10, at the rate of 3 bushels per acre. It was harvested August 14. The following yields were obtained:—

Varieties.	Yield per Acre.	
	Bush.	Lbs.
Rosedale	54	10
White Schonen	49	10
Cream Egyptian	49	4
Black Tartarian	43	28
Sensation	42	12
Mixed Grain	51	31

FIELD CROP OF OATS ON MARSH.

Twelve acres of marsh were ploughed in the fall of 1900. It was worked up in the spring by going over it twice with the spade harrow; twice with the springtooth, and

once with the smoothing harrow. The seed was sown broadcast by hand at the rate of 3½ bushels per acre. The grain was sown and harrowed in with the springtooth harrow, after which clover and timothy, at the rate of 3 pounds alsike, 7 pounds mammoth red clover, and 12 pounds timothy seed per acre were sown and worked up by going over it once with the smoothing harrow. No fertilizer of any kind was used. Eight acres of this were sown May 20, and yielded at the rate of 35 bushels per acre.

Another four acres were low, wet marsh, which made it difficult to work, and seeding was not done on it until June 5. The land was worked in a manner similar to the other marsh and seeded at the same rate. The yield from this was at the rate of 20 bushels per acre.

Owing to the dry season the straw was very short, and the yield very light. That grown on the low, wet land was also badly injured with rust.

FIELD CROPS OF MIXED GRAIN ON UPLAND.

The grain used in this field was made up as follows:—Oats, 2 bushels; barley, 1 bushel; pease, 1 peck, mixed together and sown at the rate of three bushels per acre. The seed was sown May 11 and harvested August 17.

The soil was a light clay loam. The previous crop was turnips, and the land received for this crop, 18 one-horse cart loads of manure and 200 pounds complete fertilizer per acre. No fertilizer of any kind was used with the grain crop. The yield per acre was 50 bushels.

FIELD CROP OF BUCKWHEAT.

Ten acres of buckwheat was grown on land which was in a poor state of fertility. The previous crop was buckwheat, seeded to clover. The clover made a very poor growth. The land was ploughed in the spring, and worked up with the disc, springtooth and smoothing harrows. It was seeded to silver-hull buckwheat, June 20, at the rate of 1 bushel per acre. Owing to the hot dry weather the crop blighted, and did not fill out well.

The yield from this field was 126 bushels.

Five acres of land, which was also in a poor state of fertility, having previously a crop of buckwheat, seeded down with clover, was sown June 20 to silver-hull buckwheat at the rate of 1 bushel per acre, and Albert Thomas Phosphate at the rate of 200 pounds per acre was sown with the seed by means of the fertilizer attachment on the seeder. The yield from this field was 84 bushels. This field did not blight nearly so badly as the 10 acres, due possibly to being later sown, and the blossoming period escaping the hot weather.

EXPERIMENTS WITH INDIAN CORN.

The soil on which the corn plots were laid out was a clay loam. The previous crop was timothy. The land was manured in the fall of 1900 on the sod, with 20 one-horse cart loads of barn-yard manure per acre. This manure together with a good crop of grass was ploughed under June 1, 1901. The land was worked with the disc harrow once, and once with the smoothing harrow. Marks were made 3 feet apart, and the seed dropped in the rows, after which it was covered with the hoe by hand. Duplicate plots were also sown in hills 3 feet apart.

The seed was sown June 3, and the crop was harvested September 27. No chemical fertilizers were used on these plots. The yield per acre is estimated from the crop obtained from two rows, each 66 feet long. Thirty-four varieties were included in the test, and the following results were obtained:—

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Height.	Leafiness.	When Tasseled	In Silk.	Condition when cut, Sept. 27.	Weight per acre grown in rows.	Weight per acre grown in hills.
	In.					Tons. lbs.	Tons. lbs.
Early Mastodon	83	Medium..	Aug. 25	Sept. 1	Milk.....	20 150	19 500
Cloud's Early Yellow	84	" ..	" 28	" 5	Watery.....	19 1,600	17 100
Mammoth Cuban	98	" ..	" 31	" 10	Silk.....	17 650	17 650
Champion White Pearl	84	" ..	" 22	" 3	Late milk .	17 320	14 1,150
Selected Leaming	84	" ..	" 22	" 3	" ..	17 100	14 1,700
Early Butler	73	" ..	" 22	" 3	" ..	16 1,220	14 1,700
Early Yellow Long Eared	66	" ..	" 19	Aug. 30	Soft glazed..	16 1,000	15 800
Pride of the North	92	" .	" 25	Sept. 1	Milk.....	15 1,900	17 650
Longfellow	75	Very.. ..	" 17	Aug. 28	Soft glazed..	15 250	12 1,520
Red Cob Ensilage	100	Medium..	Sept. 20	" 28	Tasseled	14 1,700	14 1,700
Rural Thoroughbred White Flint	86	" .	" 20	Sept. 25	Silk.....	14 1,700	15 250
Giant Prolific Ensilage	90	" ..	" 28	" 10	Early milk..	14 1,370	15 1,570
Extra Early Huron Dent	96	" ..	" 22	" 3	" ..	14 1,370	11 1,650
Angel of Midnight	73	Very.....	" 17	Aug. 28	Soft glazed..	14 1,370	11 1,650
Sanford	74	"	" 19	Sept. 1	Late milk ..	14 270	13 950
King of the Earliest	72	Medium..	" 19	" 15	Watery.....	14 50	13 1,500
Salzer's All Gold	72	" ..	" 23	" 15	Late milk ..	14 50	14 1,700
Compton's Early	75	Very.....	" 15	Aug. 26	Soft glazed..	14 50	13 950
Ruby Mexican	85	"	" 26	Sept. 7	Milk.....	13 1,720	13 400
Evergreen Sugar	78	Medium..	" 25	" 7	"	13 1,500	13 1,500
North Dakota Yellow	72	Very.....	" 17	Aug. 25	Glazed	13 950	14 1,600
Kendall's Early Giant	86	Medium .	Aug. 15	" 30	Soft glazed..	13 950	14 600
Salzer's Superior Fodder	84	"	" 15	" 30	Silk	13 620	15 250
Mammoth Eight-rowed Flint	90	"	" 19	Sept. 1	Early milk.	13 620	15 250
White Cap Yellow Dent	98	"	" 20	" 1	" ..	13 400	15 1,900
Canada White Flint	72	"	" 19	Aug. 30	Soft glazed..	13 400	14 600
Country Gentleman	75	Very.....	" 19	" 30	" ..	12 1,850	13 400
North Dakota White	73	Medium..	" 19	" 30	Early milk..	12 750	11 1,650
Pearce's Prolific	72	Very....	" 17	" 26	Glazed	12 750	11 1,650
Salzer's Earliest Ripe	56	"	" 17	" 26	"	10 900	10 900
Yellow Six Weeks	60	"	" 1	" 15	Hard glazed	10 550	9 1,800
Early August	60	"	" 1	" 15	" ..	9 1,800	9 150
Mitchell's Extra Early	60	"	" 1	" 15	" ..	9 370	8 500
Extra Early Szekely	60	"	" 1	" 15	" ..	8 1,600	9 150

CORN SOWN IN ROWS AT DIFFERENT DISTANCES.

Similar experiments to those conducted last year were made with Indian corn to gain information as to the distances apart the rows should be planted to give the largest yield per acre. Champion White Pearl, Longfellow and Selected Leaming were the varieties used.

The land on which this corn was planted was a clay loam in a good state of fertility. The previous crop was clover, the aftermath of which was ploughed under in the fall of 1900. This ground was disc-harrowed in the spring, and stable manure at the rate of 20 one-horse cart loads per acre was spread broadcast and ploughed under. The ground was worked up with the disc, springtooth and smoothing harrows, after which the seed was sown with the seed drill in rows 21, 28, 35 and 42 inches apart. The seed was sown June 8, and the crop harvested October 1. The plots were one-fortieth acre each, and from the crop obtained from these plots the following yields per acre have been calculated.

CORN AT DIFFERENT DISTANCES APART.

Name of Variety.	Distances between rows.	Yield per acre.	
	Inches.	Tons	lbs.
Selected Leaming	21	22	1,450
"	28	24	1,000
"	35	21	625
"	42	18	225
Longfellow	21	18	900
"	28	20	600
"	35	18	575
"	42	18	900
Champion White Pearl	21	18	...
"	28	21	1,750
"	35	18	1,510
"	42	18	1,125

It will be seen that in each of these trials, the corn planted 28 inches apart gave the heaviest crop.

EXPERIMENTS WITH TURNIPS.

The soil of these plots was a clay loam in a good state of fertility. The previous crop was clover, the aftermath of which was ploughed under in the fall of 1900. In the spring this was worked up with the spade harrow, and 20 one-horse cart loads of stable manure per acre was spread broadcast and ploughed under. This was then gone over with the springtooth and once with the disc harrow, and once with the smoothing harrow. Two hundred pounds of complete fertilizer per acre was sown broadcast and harrowed in with the smoothing harrow. The land was then run up into drills 24 inches apart. The rows were raked off by hand, and marks made along the top of the rows into which the seed was dropped and lightly covered.

The first series of plots was sown May 27, and duplicate ones two weeks later, June 10. The roots were all pulled October 30, and the following yields per acre were calculated from two rows, each 66 feet long. Twenty-nine varieties were included in this test. The turnip plots were somewhat infested with the turnip aphis (*Aphis brassicae*) toward the latter part of the season.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	1st plot sown.	2nd plot sown.	1st plot pulled.	2nd plot pulled.	Yield per acre. 1st plot.	Yield per acre. 1st plot.	Yield per acre. 2nd plot.	Yield per acre. 2nd plot.
					Tons lbs.	Bush. lbs.	Tons lbs.	Bush. lbs.
Hartley's Bronze	May 27.	June 10.	Oct. 30.	Oct. 30.	44 1,100	1,485 ..	28 925	948 45
Carter's Elephant	" 27.	" 10.	" 30.	" 30.	42 150	1,402 30	23 200	770 ..
New Arctic	" 27.	" 10.	" 30.	" 30.	41 500	1,375 ..	32 350	1,072 30
Imperial Swede	" 27.	" 10.	" 30.	" 30.	40 850	1,347 30	25 325	838 45
Perfection Swede	" 27.	" 10.	" 30.	" 30.	37 1,900	1,265 ..	30 1,875	1 031 15
Mammoth Clyde	" 27.	" 10.	" 30.	" 30.	37 1,075	1,251 15	24 1,500	825 ..
Jumbo	" 27.	" 10.	" 30.	" 30.	37 250	1,237 30	26 800	880 ..
Selected Champion	" 27.	" 10.	" 30.	" 30.	36 1,425	1,223 45	30 225	1,003 45
Bangholm Selected	" 27.	" 10.	" 30.	" 30.	35 950	1,183 30	24 1,500	825 ..
Giant King	" 27.	" 10.	" 30.	" 30.	35 950	1,183 30	22 550	742 30
Prize Purple Top	" 27.	" 10.	" 30.	" 30.	34 475	1,141 15	28 1,750	962 30
Selected Purple Top	" 27.	" 10.	" 30.	" 30.	34 475	1,141 15	24 1,500	825 30
Halewood's Bronze Top	" 27.	" 10.	" 30.	" 30.	33 1,650	1,127 30	26 800	880 ..
Kangaroo	" 27.	" 10.	" 30.	" 30.	33 1,650	1,127 30	24 1,500	825 ..
Marquis of Lorne	" 27.	" 10.	" 30.	" 30.	33 1,650	1,127 30	25 1,975	866 15
Monarch	" 27.	" 10.	" 30.	" 30.	33 1,650	1,127 30	24 675	811 15
Shamrock Purple Top	" 27.	" 10.	" 30.	" 50.	33 1,650	1,127 30	28 1,758	962 30
Webb's New Renown	" 27.	" 10.	" 30.	" 30.	33	1,100 ..	26 1,625	893 45
Hall's Westbury	" 27.	" 10.	" 30.	" 30.	31 1,525	1,058 45	25 1,150	852 30
East Lothian	" 27.	" 10.	" 30.	" 30.	31 700	1,045 ..	22 1,375	756 15
Emperor Swede	" 27.	" 10.	" 30.	" 30.	31 700	1,045 ..	29 1,400	990 ..
West Norfolk Red Top	" 27.	" 10.	" 30.	" 30.	30 1,875	1,031 15	29 1,400	990 ..
Elephant's Master	" 27.	" 10.	" 30.	" 30.	30 1,875	1,031 15	20 1,250	687 30
Skirvings	" 27.	" 10.	" 30.	" 30.	30 225	1,003 45	22 1,375	756 15
Drummond Purple Top	" 27.	" 10.	" 30.	" 30.	29 1,400	990 ..	26 1,625	893 45
Champion Purple Top	" 27.	" 10.	" 30.	" 30.	28 1,750	962 30	18 1,125	618 45
Magnum Bonum	" 27.	" 10.	" 30.	" 30.	28 1,750	962 30	19 1,600	660 ..
Sutton's Champion	" 27.	" 10.	" 30.	" 30.	28 1,750	962 30	21 75	701 15
Prize Winner	" 27.	" 10.	" 30.	" 30.	28 700	935 ..	20 1,250	687 30

EXPERIMENTS WITH MANGELS.

Twenty-five varieties of mangels were sown May 27, and duplicate plots two weeks later, June 10. The land on which these were grown was previously in clover, the aftermath of which was ploughed under in the fall of 1900. This land was a clay loam and was in a good state of fertility. Twenty one-horse cart loads of stable manure was applied broadcast this spring, after the ground had been gone over once with the disc harrow. The manure was then ploughed under, and after the springtooth harrow had gone over it the disc was again used. The smoothing harrow was also run over it, after which complete fertilizer at the rate of 200 pounds per acre was sown broadcast, and worked in with the smoothing harrow. The land was then run into drills 24 inches apart. The rows were raked off and the seed sown in holes one foot apart, made with a marker, and from three to six seeds dropped in a place. These were covered by hand with a garden rake.

The plants came up very irregularly, particularly this was the case with the first sown plots. This may have been the fault of the seed to some extent, but more likely on account of the cold wet weather, which continued for some time after they were sown.

The roots from both series of plots were pulled October 30, and the following yield per acre was calculated from two rows, each 66 feet long.

MANGELS—TEST OF VARIETIES.

Name of Variety.	1st plot sown.	2nd plot sown.	1st plot pulled.	2nd plot pulled.	Yield per acre. 1st plot.	Yield per acre. 1st plot.	Yield per acre. 2nd plot.	Yield per acre. 2nd plot.
					Tons lbs.	Bush. lbs.	Tons lbs.	Bush. lbs.
Gate Post	May 27.	June 10.	Oct. 17.	Oct. 17.	39 1,200	1,320 ..	32 1,175	1,086 15
Golden Fleshed Tankard	" 27.	" 10.	" 17.	" 17.	37 1,075	1,251 15	28 100	935 ..
Half Long Sugar Rosy	" 27.	" 10.	" 17.	" 17.	35 1,775	1,196 15	30 225	1,003 45
Giant Yellow Globe	" 27.	" 10.	" 17.	" 17.	35 620	1,177 ..	33 ..	1,100 ..
Half Long Sugar White	" 27.	" 10.	" 17.	" 17.	35 125	1,163 45	31 700	1,045 ..
Warden Orange Globe	" 27.	" 10.	" 17.	" 17.	34 1,795	1,163 15	31 205	1,036 45
Canadian Giant	" 27.	" 10.	" 17.	" 17.	34 1,300	1,155 ..	31 700	1,045 ..
Red Fleshed Tankard	" 27.	" 10.	" 17.	" 17.	33 1,650	1,127 30	25 1,975	866 15
Mammoth Yellow Intermediate	" 27.	" 10.	" 17.	" 17.	33	1,100 ..	37 250	1,237 30
Champion Yellow Globe	" 27.	" 10.	" 17.	" 17.	32 1,340	1,089 ..	31 1,525	1,058 45
Norbiton Giant	" 27.	" 10.	" 17.	" 17.	32 350	1,072 30	32 1,175	1,086 15
Mammoth Oval Shaped	" 27.	" 10.	" 17.	" 17.	31 1,525	1,058 45	31 1,195	1,053 15
Ward's Large Oval Shaped	" 27.	" 10.	" 17.	" 17.	31 700	1,045 ..	35 125	1,168 45
Yellow Intermediate	" 27.	" 10.	" 17.	" 17.	30 1,875	1,031 15	31 700	1,045 ..
Lion Yellow Intermediate	" 27.	" 10.	" 17.	" 17.	29 1,895	998 15	33 825	1,113 45
Prize Mamm. Long Red	" 27.	" 10.	" 17.	" 17.	29 1,895	998 15	29 575	976 15
Leviathan Long Red	" 27.	" 10.	" 17.	" 17.	29 400	990 ..	30 1,875	1,031 15
Giant Yellow Half Long	" 27.	" 10.	" 17.	" 17.	29 400	990 ..	30 1,875	1,031 15
Gate Post Yellow	" 27.	" 10.	" 17.	" 17.	29 400	990 ..	31 205	1,036 45
Mammoth Long Red	" 27.	" 10.	" 17.	" 17.	28 1,750	962 30	28 925	948 45
Yellow Fleshed Tankard	" 27.	" 10.	" 17.	" 17.	28 1,750	962 30	36 1,755	1,229 15
Selected Mammoth Long Red	" 27.	" 10.	" 17.	" 17.	28 760	946 ..	28 100	935 ..
Giant Yellow Intermediate	" 27.	" 10.	" 17.	" 17.	27 1,440	924 ..	31 1,525	1,058 45
Prize Winner Yellow Globe	" 27.	" 10.	" 17.	" 17.	27 1,275	921 15	27 1,275	921 15
Triumph Yellow Globe	" 27.	" 10.	" 17.	" 17.	25 325	838 45	31 1,525	1,058 45

EXPERIMENTS WITH CARROTS.

The experiments with carrots were conducted on land which was clay loam in a good state of fertility. The land previously was in clover, the aftermath of which was ploughed under in the fall of 1900. Stable manure at the rate of 20 one-horse cart loads per acre was spread broadcast in the spring of 1901, after the ground had been once worked with the disc harrow. The manure was ploughed under, and the land harrowed once with the spring-tooth harrow. The disc harrow was again used, after which the smoothing harrow went over the ground. Complete fertilizer at the rate of 200 pounds per acre was sown broadcast, and harrowed in with the smoothing harrow. The land was then run into drills 24 inches apart.

The rows were raked off by hand, and marks made along the top of the rows into which the seed was sown and covered with the garden rake. Twenty varieties of carrots were grown, and the yield per acre was calculated from two rows, each 66 feet long. The seed was sown May 27, and duplicate plots were sown two weeks later, June 10. The crop was harvested October 30, and the following particulars obtained:—

CARROTS—TEST OF VARIETIES.

Name of Variety.	1st plot sown.	2nd plot sown.	1st plot pulled.	2nd plot pulled.	Yield per acre. 1st plot.	Yield per acre. 1st plot.	Yield per acre. 2nd plot.	Yield per acre. 2nd plot.
					Tons. lbs.	Bush. lbs.	Tons. lbs.	Bush. lbs.
Giant White Vosges.....	May 27	June 10	Oct. 30	Oct. 30	31 700	1,045 ..	21 900	715 ..
Ontario Champion.....	"	"	"	"	30 1,050	1,017 30	21 1,725	728 45
Mammoth White Intermediate.....	"	"	"	"	29 1,400	990 ..	17 1,475	591 15
White Belgian..... .. .	"	"	"	"	29 1,400	990 ..	19 1,600	660 ..
New White Intermediate.	"	"	"	"	28 100	935 ..	21 900	715 ..
Improved Short White ..	"	"	"	"	27 450	907 30	19 775	646 15
Green Top White Orthe..	"	"	"	"	26 1,295	888 15	21 900	715 ..
Guerande or Ox-heart ...	"	"	"	"	26 800	880 ..	17 650	577 30
Yellow Intermediate	"	"	"	"	24 1,500	825 ..	20 1,250	687 30
Early Gem.....	"	"	"	"	24 1,005	816 45	16 1,825	563 45
Long Yellow Stump Rooted.....	"	"	"	"	24 675	811 15	19 775	646 15
Half Long Chantenay....	"	"	"	"	23 1,025	783 45	19 1,600	660 ..
Iverson's Champion.....	"	"	"	"	21 1,725	728 45	20 1,250	687 30
Half Long White.... ..	"	"	"	"	21 1,725	728 45	20 425	673 45
Long Scarlet Altringham.	"	"	"	"	20 425	673 45	18 525	608 45
Carter's Orange Giant....	"	"	"	"	19 775	646 15	18 525	608 45
Scarlet Intermediate.....	"	"	"	"	19 775	646 15	16 1,825	563 45
Scarlet Nantés	"	"	"	"	18 300	605 ..	11 1,925	398 45
Long Orange or Surrey...	"	"	"	"	17 1,475	591 15	16 175	536 15
White Vosges, Large Short	"	"	"	"	17 1,475	591 15	14 1,700	495 ..

EXPERIMENTS WITH SUGAR BEETS.

Seven varieties of sugar beets were sown May 27, and duplicate plots two weeks later, June 10. The yield per acre was calculated from the crop obtained from two rows, each 66 feet long. The crop was pulled October 17.

The soil was in a good state of fertility, and was previously in clover, the aftermath having been ploughed under in the fall of 1900. In the spring this was worked up with the disc harrow, and 20 one-horse cart loads of stable manure applied per acre. The land was then ploughed, and harrowed with the disc harrow. The smoothing harrow was next used, after which 200 pounds of complete fertilizer per acre was sown and worked in with the smoothing harrow. The rows were run 24 inches apart, and the seed sown in holes one foot apart, made with a marker and from 3 to 6 seeds dropped in a hole. This was covered with a garden rake. The yield per acre obtained was as follows:—

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	1st plot sown.	2nd plot sown.	1st plot pulled.	2nd plot pulled.	Yield per acre 1st plot.	Yield per acre, 1st plot.	Yield per acre, 2nd plot.	Yield per acre. 2nd plot.
					Tons lbs.	Bush. lbs.	Tons lbs.	Bush. lbs.
Improved Imperial	May 27	June 10	Oct. 17	Oct. 17	33 ..	1,100 ..	28 1,750	962 30
Red Top Sugar..... ..	" 27	" 10	" 17	" 17	27 780	913 ..	30 225	1,003 45
Danish Improved.....	" 27	" 10	" 17	" 17	25 1,975	866 15	26 1,625	893 45
Royal Giant.....	" 27	" 10	" 17	" 17	25 1,645	860 45	26 1,625	893 45
Wanzleben	" 27	" 10	" 17	" 17	25 655	844 15	21 900	715 ..
Danish Red Top..... .	" 27	" 10	" 17	" 17	25 325	838 15	28 1,750	962 30
Vilmorin's Improved.....	" 27	" 10	" 17	" 17	22 1,045	750 45	20 1,250	687 30

EXPERIMENTS WITH POTATOES.

The land on which the potatoes were grown was a clay loam. The previous crop was grain. The land was manured in the fall of 1900 with 30 one-horse cart loads of stable manure per acre, which was spread broadcast and ploughed under in the spring, this was worked up once more with the disc harrow and ploughed, after which it was gone over once each with the spring-tooth, disc and smoothing harrows, and drilled into rows 30 inches apart. No other fertilizers were used in these plots.

The seed was cut, leaving from two to three eyes in each piece, and planted one foot apart in the drills and covered with the plough.

Ninety-two varieties were planted May 17, and dug September 23 and 24. Owing to the dry weather an unusually large crop was not harvested, but they were entirely free from rot. They were sprayed with Bordeaux mixture and Paris green July 20 and August 20, and once with Paris green June 26. The yield per acre has been calculated from two rows, each 66 feet long.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Rose No. 9	418	..	385	..	33	..	Oblong and pink.
Irish Daisy	418	..	365	12	52	48	Round, white.
Canadian Beauty	404	48	360	48	44	..	Oblong, pink and white.
Sabean's Elephant	402	36	365	12	37	24	Oblong, white.
Early Fortune	396	..	369	36	26	24	Long, round, pink.
Late Puritan	385	..	363	..	22	..	Long, white.
Troy Seedling	374	..	301	24	72	36	Round, white.
Holborn Abundance	360	48	325	36	35	12	"
Rural No. 2	360	48	334	24	26	24	"
Seedling No. 7	356	24	330	..	26	24	Oval, pink.
Brown's Rot Proof	356	24	268	24	88	..	"
Clay Rose	352	..	319	..	33	..	Round, pink.
Swiss Snowflake	352	..	319	..	33	..	Round, white.
Cambridge Russet	352	..	312	24	39	36	"
Enormous	352	..	330	..	22	..	Oblong, white.
Rural Blush	349	48	312	24	37	24	Round, pink.
Seattle	345	24	308	..	37	24	Long, white.
Dreer's Standard	345	24	301	24	44	..	Round, white.
Bill Nye	341	..	301	24	39	36	"
Carman No. 3	341	..	323	24	17	36	"
Pride of the Market	341	..	308	..	33	..	Long, pink and white.
Penn. Manor	341	..	312	24	28	36	Long, pink.
Hale's Champion	336	36	281	36	55	..	Long, white.
Vick's Extra Early	336	36	308	..	28	36	Oval, white.
Rawdon Rose	336	36	281	36	55	..	Oblong, pink and white.
Houlton Rose	332	12	310	12	22	..	Long, pink.
Brownell's Winner	332	12	310	12	22	..	"
Beauty of Hebron	330	..	275	..	55	..	Round, pink and white.
Vanier	327	48	301	36	24	12	Long, pink.
Pearce's Prize Winner	323	24	299	12	24	12	Long, white.
Prolific Rose	319	..	268	24	50	36	Oblong, pink and white.
McIntyre	316	48	277	12	39	36	Round, white and blue.
White Beauty	316	48	281	36	35	12	Long, round, white.
Mortgage Lifter	316	48	250	48	66	..	Oblong, white.
Great Divide	312	24	290	24	22	..	Long, white.
Sir Walter Raleigh	310	12	286	..	24	12	Round, pink and white.
Seedling No. 230	308	..	250	48	57	12	Round, white.
Early St. George	303	36	275	12	48	24	Oblong, pink and white.
Quaker City	303	36	259	36	44	..	Round, white
Pearce's Extra Early	297	..	264	..	33	..	Long, pink.
Everett	294	48	237	36	57	12	Flattish, pink.
Money Maker	292	36	246	24	46	12	Long, pink and white.
Country Gentleman	292	36	275	..	17	36	"

POTATOES—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Prize Taker	290	24	235	24	55	..	Round, white.
Dakota Red	290	24	246	24	44	..	Round, red.
Irish Cobbler	290	24	253	..	37	24	Round, white.
Flemish Beauty	288	12	253	..	35	12	Long, flat, pink.
Columbus	288	12	259	36	28	36	Long, white.
Northern Spy	286	..	264	..	22	..	Round, red.
Maggie Murphy	286	..	264	..	22	..	Long, pink.
Delaware	279	24	244	24	33	..	Round, white.
Thorburn	277	12	248	36	28	36	Oblong, pink, white.
Calico	277	12	211	12	66	..	Long, pink and white.
General Gordon	275	..	246	24	28	36	Oblong, pink.
Ohio Junior	275	..	253	..	22	..	Round, pink.
Burnaby Seedling	272	48	261	48	11	..	Round, pink.
American Giant	272	48	244	12	28	36	Long, white.
Early Norther	272	48	250	48	22	..	Long, pink and white.
Uncle Sam	270	36	237	36	33	..	Oblong, white.
Maule's Thoroughbred	268	24	235	24	33	..	Oblong, white.
Green Mountain	266	12	233	12	33	..	Oval, white.
I. X. L.	266	12	244	12	22	..	Long, pink and white.
New Queen	264	..	220	..	44	..	Oblong, pink.
Rochester Rose	264	..	233	12	30	48	Oblong, pink.
Early White Prize	259	36	242	0	17	36	Round, white.
Lizzie's Pride	259	36	226	36	33	..	Long, pink.
Early Harvest	257	24	224	24	33	..	Oval, pink and white.
Early Andes	255	12	198	..	57	12	Round, pink.
New Variety No. 1	253	..	220	..	33	..	Round, pink.
Carman No. 1	250	48	215	36	35	12	Flat, round, white.
Early Puritan	248	36	237	36	11	..	Long, white.
Empire State	233	12	220	..	13	12	Oval, white.
Sharpe's Seedling	224	24	200	12	24	12	Round, pink and white.
State of Maine	222	12	182	36	39	36	Round, white.
Early Six Weeks	220	..	182	36	37	24	Oblong, pink.
Lee's Favourite	220	..	180	24	39	36	Round, white.
Early Sunrise	213	24	187	..	26	24	Long, pink.
Chicago Market	211	12	189	12	22	..	Long, red.
Up to Date	211	12	167	12	44	..	Round, white.
Burpee's Extra Early	211	12	189	12	22	..	Long, pink and white.
American Wonder	209	..	193	36	15	24	Round, white.
Reading Giant	209	..	147	24	61	36	Oval, pink.
Reeve's Rose	204	36	176	..	28	36	Long, pink.
Daisy	200	12	167	12	33	..	Long, pink and white.
Early Market	193	36	154	..	39	36	Round, pink.
Bovee	191	24	158	24	33	..	Long, pink.
Early Rose	187	..	165	..	22	..	Long, pink.
Polaris	187	..	165	..	22	..	Long, white.
Clarke's No. 1	187	..	165	..	22	..	Long, pink.
Earliest of All	187	..	160	36	26	24	Long, pink.
Early Ohio	176	..	154	..	22	..	Long, pink.
Early Michigan	171	36	138	36	33	..	Long, white.

EXPERIMENTS WITH MILLET.

The land on which the millets were grown was a clay loam and had potatoes on it for a previous crop. It was manured in the fall of 1899 for the potatoes at the rate of 25 one-horse cart loads of manure per acre. The land was ploughed after the potatoes were removed and worked up the following spring with the disc, spring-tooth and smoothing harrows. The seed was sown June 5 with the Planet Junior seed drill. The plots were one-fortieth acre each. Seven varieties were sown, and the crop was cut and weighed September 14. The yield per acre was calculated from the plots as follows:—

EXPERIMENTS WITH MILLET.

Name of Variety.	Yield per Acre.	
	Tons.	Lbs.
Japanese	12	1,000
Moha Hungarian	12	800
Italian, or Indian	11	
Cat-tail	8	1,800
German, or Golden	8	200
Pearl	4	1,200

EXPERIMENTS WITH SOJA BEANS.

Experiments were again conducted with soja beans to gain information as to their value as a forage crop, and also to find out the yield per acre from this crop sown at different distances apart. The soil used was a clay loam, which had potatoes on it as a previous crop. It was manured for the potatoes in the fall of 1899 with stable manure, at the rate of 25 one-horse cart loads per acre. The land was ploughed after the potatoes were dug, and worked up the following spring with the disc, spring-tooth and smoothing harrows. The beans were sown with the Wisner seed drill, June 10, in rows 21, 28 and 35 inches apart, and the crop was cut and weighed October 1. The yield per acre has been calculated from the quantity obtained from plots of one-fortieth acre each. The crop made strong growth, but the beans had only just commenced to form at date of cutting. The season here does not appear to be long enough to bring this crop to sufficient maturity to make it valuable.

Distances apart.	Yield per Acre.	
	Tons.	Lbs.
Soja beans, 21 inches	8	1,800
" 28 "	7	1,000
" 35 "	6	400

EXPERIMENTS WITH HORSE BEANS.

Experiments were also conducted with the English horse bean, the variety 'Tick' being used. They were sown at different distances in rows 21, 28 and 35 inches apart. The soil was similar to that on which the soja beans were grown, and received the same treatment. The beans were on plots of one-fortieth acre each. These made good growth during the first part of the season, but were almost destroyed, as were all the other horse beans on the farm, by the 'Black Dolphin' horse bean aphis, which infested the plants in countless numbers.

Distances apart.	Yield per Acre.	
	Tons.	Lbs.
Horse beans, 21 inches	3	1,000
" 28 "	3	1,680
" 35 "	5	

EXPERIMENTS WITH FERTILIZERS ON WHEAT.

Experiments to test the value of different kinds of fertilizers on this grain crop were again conducted this year. The Preston wheat was used. The size of each plot was one-fortieth acre, and six plots made up the test. The land on which these tests were carried on was a poor light clay loam. The previous crop was grain, having received for that crop 100 pounds complete fertilizer per acre. This land has never had any stable manure, and having been cropped several times, was in a poor state of fertility.

The land was ploughed in the spring, and was worked up with the spring-tooth twice, and once with the smoothing harrow before seeding. The grain was sown with the seed drill June 6, and harvested September 3.

One-half of the nitrate of soda for plots 1 and 2 was sprinkled finely over the ground when the grain was 2 inches high, and the other half when it was 6 inches high. The fertilizer used in plots 4 and 5 was scattered on the ground just before sowing and lightly covered with the harrow. On plot 6 one-half of the fertilizer was scattered finely over the ground before sowing, and lightly covered with the harrow, and the other half was sprinkled over the ground when the grain was 2 or 3 inches high. Plot 3 was not fertilized, being left for a check. The results were as follows:—

Plot.	Variety of Wheat sown.	Fertilizers used per Acre.		Yield per Acre.	
			Lbs.	Bush.	Lbs.
1	Preston	Nitrate of soda	100	23	20
2	"	"	200	22	00
3	"	Check		20	00
4	"	Superphosphate	400	22	00
5	"	Muriate of potash	400	24	20
6	"	A mixture of—			
		Superphosphate	200		
		Muriate of potash	100		
		Nitrate of soda	100	23	20

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Experiments for the purpose of ascertaining the relative value of fertilizers, commonly used for field crops of various kinds, were again conducted this year.

The plots were one-eighth acre each, 38 x 143½ feet, for each kind of fertilizer used. These were subdivided into ten strips 14 feet wide, each running lengthwise across all the differently fertilized plots. These strips were sown with ten different kinds of crops, namely, potatoes, mangels, turnips, carrots, corn, oats, pease, barley, wheat and mixed grain, making in all 140 plots. A margin of two feet was left between each plot, and one foot between each crop plot. Two plots were left without any fertilizers to serve as check plots. Each of the crops were sown at about the same time as the uniform test plots of the particular crop, with the same amount of seed per acre, and were cultivated in the same manner. The strips that are in grain one year are planted to roots, potatoes and corn the following year, and vice versa. The quantity and kinds of fertilizers used are applied each year. This is the third year of the test. The following table gives the yield per acre of the various crops, as calculated from the quantity obtained from each plot:—

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Fertilizer Used.	Barley, Duckbill.		Oats, Banner.		Wheat, Colorado.		Mixed Grain—Oats, barley, pease.		Pease, Golden Vine.		Indian Corn.		Turnips.		Mangels.		Carrots.		Potatoes—Delaware and State of Maine.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Manure, 30 tons..	58	16	70	20	36	40	75	16	41	40	18	1,000	29	500	24	1,000	28	1,000	396	40
Manure, 15 tons, fertilizer, 250 lbs..... .	60	20	73	18	33	20	73	18	38	20	18	1,000	31	500	22	700	25	0	423	20
Complete fertilizer, 1,000 lbs....	47	44	58	28	28	20	58	28	33	20	17	1,000	24	500	15	1,000	18	500	340	0
Complete fertilizer, 500 lbs.	45	40	52	32	25	0	55	30	30	0	14	0	23	0	16	0	18	1,000	315	0
Check (no fertilizer).....	33	16	44	26	23	20	44	4	31	40	13	0	18	1,000	15	700	15	1,000	250	0
Bone meal, 1,000 lbs.....	39	28	55	30	26	40	67	22	30	0	13	1,500	23	1,500	20	0	19	0	308	20
" 500 "	37	24	58	28	30	0	52	32	28	20	14	500	23	500	18	700	21	200	273	20
Ashes, 2,500 "	34	16	50	0	25	0	44	4	38	20	15	0	23	1,000	18	1,500	21	1,000	325	0
Manure, rotted, 20 tons ..	56	12	67	22	33	20	73	18	45	0	17	1,000	30	0	20	1,700	27	500	495	0
Check (no fertilizer).....	34	16	41	6	21	40	41	6	35	0	13	1,500	19	500	10	700	15	500	248	20
Land plaster, 500 lbs.....	35	20	47	2	23	20	50	0	36	40	13	1,500	19	500	9	1,950	17	500	230	0
Salt, 500 "	43	36	52	32	26	40	52	32	40	0	15	0	21	1,500	15	1,520	21	0	221	40
Marsh mud, 100 tons.....	45	40	64	24	30	0	61	26	41	40	16	0	26	500	21	500	24	800	293	20
Manure, 20 tons (green) ..	50	0	67	22	33	20	70	20	45	0	22	1,000	30	300	27	1,300	29	900	418	20

FIELD CROP OF CORN.

Two acres of corn was grown on land that had timothy as a previous crop. It was manured on the sod in the fall of 1900, with 20 one-horse cart loads of stable manure per acre. This was ploughed June 1, when a good crop of grass was turned under with the manure. The land was then worked up with the disc, spring-tooth and smoothing harrows, and the seed sown June 3 with the grain drill in rows three feet apart. This corn made excellent growth. The yield obtained was 31 tons.

Two acres was also grown on land that was previously seeded to clover in the spring of 1900, together with a pea crop. The pea aphis destroyed the pea crop, and the clover produced a grand aftermath by fall. This was manured in the autumn, and in the spring was ploughed and worked up, and the corn sown June 6 in rows 3 feet apart. The varieties 'Longfellow' and 'Selected Leaming' were mixed and sown together. The yield obtained from this field was 34 tons 650 pounds.

One acre was grown on land that was of poor fertility, not having had any manure previously. The previous crops were grain, with one crop of pease ploughed under in the year 1899. This land was manured this spring at the rate of 30 one-horse cart loads per acre, which was spread broadcast and ploughed under. It was then worked up with the disc, spring-tooth and smoothing harrows, after which the seed was sown in rows 3 feet apart. The variety, 'Angel of Midnight,' was sown. The yield from this field was 13 tons. The crop was sown June 6, and harvested October 1.

FIELD CROP OF TURNIPS.

The soil of this field was a clay loam in a poor state of fertility. It had never had any manure before. The previous crops were grain, and with the exception of a crop of pease ploughed under in 1899, no fertilizer had been previously given. The land was ploughed in the fall of 1900, and in the spring was disc-harrowed, after which 30 one-horse cart loads of stable manure per acre was spread and ploughed under. It was then worked with the disc, spring-tooth and smoothing harrows, after which 200 pounds of complete fertilizer was sown on one-half of each one acre plot.

This was harrowed in with the smoothing harrow, and drills were run 24 inches apart, and the seed sown with the turnip seeder. Four varieties were sown in one acre plots each, one-half of which were manured and fertilized, the other half having received manure only. The following yields were obtained per acre:—

FIELD CROPS OF TURNIPS.

Name of Variety and size of plots.	Yield per acre.		Yield per acre.	
	Tons	lbs.	Bus.	lbs.
½ acre plots—				
Carter's Elephant, manure with fertilizer	18	1,260	621	..
" " only	16	220	537	..
Drummond Purple Top, manure with fertilizer	17	1,625	593	45
" " only	15	750	512	30
Skirvings, manure with fertilizer	18	1,275	621	15
" " only	18	795	613	15
Purple Top	18	1,800	630	..

FIELD CROPS OF MANGELS.

The land on which the field mangels were grown was a clay loam in a good state of fertility, the previous crop having been clover, the aftermath of which was ploughed under in the fall of 1900. This was disc-harrowed the following spring, and 20 one-horse cart loads of stable manure per acre was spread and ploughed under. This was then worked up with the disc, spring-tooth and smoothing harrows, after which complete fertilizer was sown broadcast at the rate of 400 pounds per acre on one-half of each one acre lot and harrowed in. The other half acre of each lot was left without any commercial fertilizer.

Drills were run 24 inches apart, and the seed planted in holes one foot apart, made with a marker and from 3 to 6 seeds were dropped in each hole. These were covered by running a land roller over the rows. Four varieties of mangels were sown in these plots, and the following yields were obtained:—

FIELD CROPS OF MANGELS.

Name of Variety and Size of Plot.	Yield per acre.		Yield per acre.	
	Tons	lbs.	Bus.	lbs.
½ acre plot—				
Mammoth Long Red, manure with fertilizer	30	1,520	1,025	20
" only	27	120	902	..
Yellow Globe, manure with fertilizer	31	1,320	1,055	20
" " only	29	360	972	40
Yellow Intermediate, manure with fertilizer	35	600	1,176	40
" " only	34	1,150	1,162	30
Gate Post	24	1,500	825	..

HAY.

One field containing eight acres which was seeded down to clover and timothy in the spring of 1900, yielded 26 tons 320 pounds.

Three acres of clover and timothy, seeded down the same spring, yielded 5 tons 275 pounds.

One field of eight acres, seeded down the same year, yielded 19 tons 110 pounds.

This hay was all secured in excellent condition, and was grown on the upland.

Four acres of clover and timothy on the marsh, seeded down in the spring of 1900, yielded 10 tons 1,100 pounds.

Thirty-six acres of marsh also yielded 72 tons 1,310 pounds of timothy hay.

The total amount harvested was 133 tons 1,105 pounds, which was secured in first-class condition.

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of seed grain and potatoes were again distributed this year to farmers making application from different parts of the provinces. The following number of three-pound lots were sent to the various applicants:—

Oats	260
Barley	78
Wheat	89
Pease	22
Buckwheat	10
Winter Rye	8
Potatoes	278
Total	745

CORRESPONDENCE.

Apart from the receipt and despatch of circulars, there were 1,416 letters received and 1,211 sent out during the year.

AGRICULTURAL MEETINGS AND EXHIBITIONS.

I attended and addressed the following agricultural meetings during the year:—

New Brunswick Farmers' and Dairyman's Association Annual Meeting, Fredericton, January 22, 23 and 24.

Nova Scotia Farmers' Association Annual Meeting, Kentville, January 30, 31 and February 1.

Also farmer's meetings at Charlottetown, P.E.I., February 3.

Cardigan, P.E.I., February 4.
Middleton, P.E.I., February 8.
Charlottetown, P.E.I., February 9.
Lessonville, N.B., May 16.
Fort Lawrence, N.S., November 12.

I also addressed a series of lectures to the students of the Sussex Dairy School from 7th to 21st March.

Besides these I attended the following exhibitions:—

Winter Fair, Guelph, December 11 to 15.
Toronto Industrial, August 26 to September 7.
Pan-American Exhibition, Buffalo, N.Y.
Sussex, N.B.
Sackville, N.B.
Port Elgin, N.B.

An exhibit of farm produce was made by the Experimental Farm, Nappan, at the Nova Scotia Provincial Exhibition, Halifax, N.S., made up of the different sorts of grains, roots, fruits and vegetables grown here.

LIVE STOCK.

HORSES.

Six are the number at present kept on the farm, four of which are used exclusively for draught purposes, one for general purposes, and one driver.

During the year one horse has died. His death was caused by acute indigestion. Another of the older horses (16 years old) was exchanged for a younger and more suitable horse. Besides these, the use of one team was had during the summer months for their feed.

DAIRY CATTLE.

During the year an addition has been made to the herd of: 1 Guernsey bull, 1 Guernsey cow, 1 Ayrshire cow and 1 Ayrshire heifer, newly imported, also two Jersey cows. Some exchanges were made during the year of old and blemished cows for others. Three deaths have occurred during the year. One, an Ayrshire from milk fever, one Holstein from eversion of the uterus, and one grade cow from milk fever. The herd at present consists of:—

1 Guernsey bull, 6 years old.
1 Guernsey bull, 2½ years old.
1 Guernsey bull, 1½ years old.
1 Ayrshire bull, 1½ years old.
1 Holstein bull, 10 months old.
3 Guernsey cows.
1 Guernsey heifer, 10 months old.
2 Ayrshire cows.
2 Ayrshire cows, 3 years old.
1 Ayrshire heifer, 2 years old.
1 Ayrshire heifer, 10 months old.
1 Holstein cow.
1 Holstein cow, 3 years old.
1 Holstein heifer, 10 months old.
2 Jersey cows.
19 Grade milch cows.
6 Grade heifers, 1½ years old.
5 Grade heifers, 10 months old.

We have also at present on hand 16 grade shorthorn steers on experiment, and 12 grade shorthorn steer calves also on experiment. Total, 78 head.

EXPERIMENTS WITH COWS.

The experiment with the dairy herd during the past year was along the same lines as that of 1900, namely, to determine whether a fairly good dairy herd, well fed and cared for, would leave a credit balance after paying for feed consumed at current prices. The experiment was begun on December 2, 1900, and continued to December 1, 1901.

The price of feed this year was about the same as last year, and the prices of the products were higher than last year. Wheat bran was charged at $19.35 per ton, corn at $22.50 per ton, oats at $22.50 per ton, and pea meal, $27 per ton, making an average price of mixed meal ration, as per proportion fed to cows, of 1½ cents per pound. Roots were valued at 5 cents per bushel, ensilage $2 per ton, and hay at $8 per ton.

The rations fed the cows in full milk in winter was, ensilage or roots, 50 pounds; meal, 10½ pounds, and hay, 10 pounds, making an average cost of 19¾ cents per cow per day.

When not milking in winter they were charged $3 per month.

Different quantities were fed to different cows according to their capacity to consume and produce.

Thirteen were in full milk when the test began, the remainder coming fresh at various times till spring. They were kept in the stable from November 1, 1900, to June 1, 1901, except on occasional fine days when they were allowed out in the yard.

They were fed regularly twice each day, and had water before them all the time. The temperature of the stable was kept at 60° Fahrenheit, as nearly as possible all the time.

They were fed, cared for and milked as regularly as possible by the same persons all the time.

They were put to pasture early in June, and until toward the end of August were left out the greater part of the time, night and day. During September and October they were kept in the stable the greater part of the time.

With the exception of the first two weeks after being turned out, they were fed entirely in the stable, on cut green feed, clover and pease, oats and vetches grown together for that purpose, and sown at intervals of from one week to ten days apart. Owing to the extremely dry weather the crop was only fair, and at least 15 acres of green feed were consumed by the herd during the summer.

While milking in summer they were charged $2.50 per month, and $1.50 per month when dry.

The milk of each cow was weighed at milking, twice each day, and a careful record kept of the number of pounds given.

The percentage of fat in the milk of each cow was determined by the Babcock milk tester, and the fat credited to the cows on the basis that 85 pounds fat produces 100 pounds marketable butter.

The milk was sent to the Nappan dairy station, and the cows were credited with the butter produced at the prices paid to all patrons of that station, which averaged for the year 23 cents per pound, less 4 cents per pound for manufacturing butter and hauling milk.

The skim milk was fed to calves and pigs, and credited to the cows at the rate of 15 cents per 100 pounds.

The following table will show the results obtained during the year:—

Name.	Breed.	Days Milking.	Milk.	Fat.	Fat.	Butter.	Value Butter.	Value Skim Milk.	Total Credit.	Cost Feed.	Cost Making Butter.	Total Cost.	Profit.
			Lbs.	p. c.	Lbs.	Lbs.	$ cts.	$ cts	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
Molly	Ay. Sh Gr.	295	8650	3·9	337·35	396·88	91 28	8 65	99 93	46 90	15 87	62 77	37 16
Corie	"	260	8186	4·0	327·44	385·22	88 60	8 18	96 78	48 95	15 40	64 35	32 43
Aiton	Ay. Grade	309	9495	3·4	322·83	377·40	86 80	9 43	96 23	48 75	15 9	63 84	32 39
Carrie	"	253	7203	3·6	259·30	305· 6	70 16	7 20	77 36	44 15	12 20	56 35	21 1
Dolly	"	266	8229	3·1	255· 9	300·10	69 2	8 22	77 24	44 30	12	56 30	20 94
Ida B	"	288	6267	4·0	250·68	294·91	67 82	6 26	74 8	45 80	11 79	57 59	16 49
Rex's Maud	Guernsey	211	4767	4·8	228·81	279·19	64 21	4 76	68 97	42 86	11 16	54 2	14 95
Bell	Ay Grade	239	5812	4·4	255·72	300·85	69 19	5 81	75	48 95	12 3	60 98	14 2
Lucy	Sh. Ay. Gr	288	7716	3·1	239·19	281·40	64 72	7 71	72 43	47 36	11 25	58 61	13 82
Ilda Rooker	Holstein	340	7070	3·4	240·38	282·80	65 4	7 7	72 11	47 65	11 31	58 96	13 15
Jesse P	Ay. Gr.	239	6056	3·6	218· 1	256·49	58 99	6 5	65 4	42 18	10 25	52 43	12 61
Ida Rooker	Holstein	237	7490	3·3	247·17	290·78	66 87	7 49	74 36	51 95	11 63	63 58	10 78
Annie	Sh. Ay. Gr	190	4966	3·8	188·70	222·	51 6	4 96	56 2	42 27	8 88	51 15	4 87
Lady Lockerby	Ayrshire	239	5297	3·6	190·69	224·34	51 59	5 29	56 88	43 54	8 97	52 51	4 37
Daisy	Ay. Gr.	309	6227	3·4	211·71	249· 8	57 28	6 22	63 50	49 50	9 96	59 46	4 4
Templeton	"	288	5632	3·4	191·48	225·28	51 81	5 63	57 44	43 42	9 1	54 43	3 1
Alice	Ayrshire	330	5038	4·0	201·52	237· 8	54 52	5 3	59 55	47 22	9 48	56 70	2 85
Ada C	Ay. Gr.	204	4196	4·0	167·84	197·45	45 41	4 19	49 60	39 65	7 89	47 54	2 6
Beatrice	Ayrshire	260	3869	4·8	185·71	218·48	50 25	3 86	54 11	43 67	8 73	52 40	1 71
Polly	Ay. Gr.	239	4196	3·9	163·64	192·52	44 27	4 19	48 46	39 5	7 70	46 75	1 71
													Loss.
Jane	"	225	4648	3·6	167·32	196·85	45 27	4 64	49 91	46 25	7 87	54 12	4 21
Violet	"	288	4909	3·0	147·27	173·25	39 84	4 90	44 74	44 90	6 93	51 83	7 09

EXPERIMENTS WITH STEERS.

This test was carried on with a view to establish some data as regards the advisability of dehorning full grown steers at the commencement of their feeding period, whether fed in loose boxes or tied in stalls.

Twenty-one 3½-year old steers and three 2½ years old were used for this test, in 3 lots of 8 each of as nearly as possible equal form, features and weight (shorthorn grades).

They were bought on October 30 and weighed the next morning, after having fasted 14 hours. The horns were then taken off lots 1 and 2 and left on lot 3. Lot 1 was put into loose box stalls, and lots 2 and 3 were tied up in stalls.

The dehorning was done with the keystone dehorning clipper.

While all bled profusely, few seemed to suffer much, although by careful weighing before, and repeatedly after dehorning, it was again found that at least two weeks were required to regain the loss in weight from dehorning.

All lots were fed alike as nearly as possible from start to finish of test, and kept in the stable all the time, except on occasional fine days when they were let out for a time, averaging not more than once each week.

Another lot of 4 of the same ages and quality as the others, as near as possible, were dehorned, fed and cared for in precisely the same manner as lots 1, 2 and 3, with the exception of being turned out daily for water.

The feeds were charged at the following prices:—Hay, $8 per ton; straw, $3 per ton; roots, $2 per ton; ensilage, $2 per ton; mixed meals averaged $22.50 per ton as per proportion fed.

RECORD of Steers fed from November 16, 1900, to March 31, 1901.

LOT I.—DEHORNED, FED IN LOOSE BOX.

Numbers.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Total Gains.
	Lbs.	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.
17	1,385	1,430	45	1,450	20	1,520	70	1,575	55	1,620	40	1,650	30	1,670	20	1,690	20	1,715	25	330
18	1,320	1,350	30	1,400	50	1,475	75	1,525	50	1,560	35	1,605	45	1,635	30	1,650	15	1,670	20	350
19	1,250	1,310	60	1,340	30	1,400	60	1,415	15	1,450	35	1,485	35	1,520	35	1,550	30	1,575	25	325
20	1,275	1,300	25	1,350	50	1,405	55	1,445	40	1,490	45	1,525	35	1,550	25	1,585	35	1,615	30	340
21	1,200	1,220	20	1,300	80	1,360	60	1,380	20	1,420	40	1,455	35	1,500	45	1,520	20	1,545	25	345
22	1,230	1,275	45	1,315	40	1,325	10	1,350	25	1,400	50	1,450	50	1,470	20	1,480	10	1,490	10	260
23	1,150	1,175	25	1,200	25	1,280	80	1,325	45	1,400	75	1,450	50	1,470	20	1,495	25	1,515	20	365
24	1,080	1,100	20	1,125	25	1,200	75	1,225	25	1,275	50	1,325	50	1,340	15	1,390	50	1,415	25	335
Totals	9,890	10,160	270	10,480	320	10,965	485	11,240	275	11,615	370	11,945	330	12,155	210	12,360	205	12,540	180	2,650

LOT II.—DEHORNED, TIED IN STALLS.

1	1,450	1,535	85	1,570	35	1,625	55	1,675	50	1,695	20	1,710	15	1,780	70	1,805	25	1,810	5	360
2	1,300	1,325	25	1,385	60	1,425	40	1,470	45	1,510	40	1,545	35	1,565	20	1,585	20	1,605	20	305
3	1,375	1,430	55	1,460	30	1,475	15	1,500	25	1,540	40	1,575	35	1,605	30	1,630	25	1,655	25	280
4	1,260	1,280	20	1,340	60	1,350	10	1,430	80	1,470	40	1,500	30	1,525	25	1,545	20	1,550	5	290
5	1,340	1,350	10	1,400	50	1,445	45	1,490	45	1,520	30	1,550	30	1,585	35	1,600	15	1,610	10	270
6	1,250	1,290	40	1,340	50	1,375	35	1,425	50	1,430	5	1,440	10	1,480	40	1,500	20	1,520	20	270
7	1,135	1,200	65	1,215	15	1,235	20	1,270	35	1,300	30	1,320	20	1,355	35	1,360	5	1,390	30	255
8	1,015	1,060	45	1,080	20	1,100	20	1,130	30	1,165	35	1,200	35	1,220	20	1,245	25	1,270	25	255
Totals	10,125	10,470	345	10,790	320	11,030	240	11,390	360	11,630	240	11,840	210	12,115	275	12,270	155	12,410	140	2,285

Record of Steers fed, November 16 to March 31, 1901—*Concluded.*

LOT III.—NOT DEHORNED, TIED IN STALLS.

Numbers.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Total Gains.
	Lbs.	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.	Lbs	Lbs.
9	1,370	1,375	5	1,410	35	1,460	50	1,490	30	1,525	35	1,555	30	1,575	20	1,600	25	1,625	25	255
10	1,320	1,375	55	1,390	15	1,430	40	1,460	30	1,490	30	1,525	35	1,535	10	1,565	30	1,600	35	280
11	1,330	1,360	30	1,400	40	1,410	10	1,450	40	1,490	40	1,535	45	1,560	25	1,605	45	1,610	5	280
12	1,310	1,365	55	1,390	25	1,410	20	1,500	90	1,540	40	1,570	30	1,580	10	1,610	30	1,640	30	330
13	1,200	1,230	30	1,275	45	1,300	25	1,330	30	1,360	30	1,385	25	1,395	10	1,425	30	1,455	30	255
14	1,160	1,190	30	1,250	60	1,275	25	1,330	55	1,360	30	1,385	25	1,425	40	1,440	15	1,460	20	300
15	1,120	1,150	30	1,175	25	1,210	35	1,220	10	1,260	40	1,300	40	1,340	40	1,365	25	1,375	10	255
16	1,120	1,150	30	1,200	50	1,230	30	1,300	70	1,310	10	1,320	10	1,340	20	1,365	25	1,390	25	270
Totals	9,930	10,195	265	10,490	295	10,725	235	11,080	355	11,335	255	11,575	245	11,750	175	11,975	225	12,155	180	2,225

LOT IV.—DEHORNED, FED IN LOOSE BOX, TURNED OUT TO WATER.

25	1,060	1,080	20	1,140	60	1,200	60	1,215	15	1,260	45	1,320	60	1,340	20	1,360	20	1,380	20	320
26	1,020	1,030	10	1,060	30	1,125	65	1,135	10	1,145	10	1,195	45	1,220	25	1,260	40	1,290	30	270
27	1,025	1,075	50	1,115	30	1,150	35	1,175	25	1,200	25	1,250	50	1,270	20	1,290	20	1,310	20	285
28	975	1,010	35	1,035	25	1,070	35	1,095	25	1,125	30	1,165	40	1,175	10	1,210	35	1,230	20	255
Totals	4,080	4,195	115	4,350	145	4,545	195	4,620	75	4,730	110	4,930	200	5,005	75	5,120	115	5,210	90	1,130

COST OF 1 STEER PER DAY FOR ENTIRE PERIOD.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	——
		$ cts.	$ cts.	$ cts.
Nov. 16 to Dec. 1	Roots, 90 lbs.	0 09	1 35	
	Meal, 2 lbs	0 02¼	0 33¾	
	Straw, 10 lbs.	0 02½	0 37½	
				2 06¼
Dec. 1 to Dec. 31	Roots, 60 lbs.	0 06	1 80	
	Meal, 4 lbs.	0 4½	1 35	
	Hay, 10 lbs.	0 04	1 20	
				4 35
Dec. 31 to Jan. 30	Roots, 50 lbs.	0 05	1 50	
	Meal, 6 lbs	0 06¾	2 02½	
	Hay, 15 lbs.	0 06	1 80	
				5 32½
Jan. 30 to March 1	Roots, 30 lbs.	0 03	0 90	
	Meal, 8 lbs	0 09	2 70	
	Hay, 12 lbs.	0 05	1 50	
				5 10
March 1 to March 31	Ensilage, 20 lbs.	0 02	0 60	
	Meal, 9 lbs	0 10⅛	3 03¾	
	Hay, 12 lbs.	0 05	1 50	
				5 13¾
Cost of feed of 1 steer				21 97½
" 28 steers				615 30

Original weight 34,025 lbs. steer at 4½c. per lb	$1,403 53
Weight at finish, 42,315 lbs. at 5½c. per lb	2,168 64
Balance	765 11
Cost of feed for lot, 135 days	615 30
Net profit	149 81

Daily rate of gain per steer	2·19
Cost of 1 lb. gain	7·42c.
" feed per day per steer	16·27c.
Profit per steer	$5.35

STEER-CALF EXPERIMENTS.

With a view to getting some particulars as to the cost of a beef bullock when ready for market, and also a comparison of limited and full feeding, twelve shorthorn grade calves were brought early in May, and divided into two groups of six each.

Lot No. 1 was fed what is termed a 'full fattening ration.'

Lot No. 2 was fed what is termed a 'limited growing ration.'

In estimating the cost of feeding calves, the following values were placed on the various feeds:—

New milk, $1 per 100 pounds.
Skim milk, 15 cents per 100 pounds.
Bibby's Cream Equivalent, $3.50 per 100 pounds.
Wheat bran, 95 cents per 100 pounds.
Crushed oats, $1 per 100 pounds.
Roots or ensilage, 10 cents per 100 pounds.
Hay, $8 per ton.

FULL FATTENING RATION—SIX STEERS, CALVES.

Period.	Daily Ration per Calf.	Amount Fed during Period.	Cost.	Total Cost.
		Lbs.	$ cts.	$ cts.
May 16 to June 1	12 lbs. whole milk	1,080	10 80	
	8 " skim milk	720	1 08	
				11 88
June 1 to July 1	10 " whole milk	1,800	18 00	
	10 " skim milk	1,800	2 70	
	¼ " bran and oil cake	37½	0 37	
				21 07
July 1 to Aug. 1	8 " whole milk	1,488	14 88	
	12 " skim milk	2,232	3 34	
	½ " bran and oil cake	93	0 93	
				19 15
Aug. 1 to Sept. 1	20 " skim-milk	3,720	5 58	
	1 " cream equivalent	186	6 50	
	½ " bran and oil cake	93	0 93	
	2 " hay	372	1 49	
				14 50
Sept. 1 to Oct. 1	10 " skim-milk	1,800	2 70	
	1 " cream equivalent	180	6 30	
	½ " bran and oil cake	90	0 90	
	2 " hay	360	1 44	
				11 34
Oct. 1 to Nov. 1	10 " ensilage	1,860	1 86	
	1 " crushed oats	186	1 86	
	½ " bran and oil cake	93	0 93	
	2 " hay	372	1 49	
				6 14
Nov. 1 to Dec. 1	20 " roots	3,600	3 60	
	1 " crushed oats	180	1 80	
	½ " bran and oil cake	90	0 90	
	2 " hay	360	1 44	
				7 74
				91 82

FULL FATTENING RATION—SIX STEERS, CALVES.

Period.	Weight at Start.	Weight at Finish.	Gain.
1900.	Lbs.	Lbs.	Lbs.
May 16 to June 1	1,000	1,130	130
June 1 to July 1	1,130	1,435	305
July 1 to Aug. 1	1,435	1,810	375
Aug. 1 to Sept. 1	1,810	2,160	350
Sept. 1 to Oct. 1	2,160	2,460	300
Oct. 1 to Nov. 1	2,460	2,730	270
Nov. 1 to Dec. 1	2,730	2,975	245

Total gain, May 16 to Dec 1	Lbs.	1,975
Weight at start	"	1,000
" finish	"	2,975
Daily rate of gain per steer	p. c.	1·64
Cost of 1 lb. gain	cts.	4·64
" feed per day per steer	"	7·72
" " of lot, 198 days	$	98·1

LIMITED GROWING RATION—SIX STEERS, CALVES.

Period 1900.	Daily Ration per Calf.	Amount fed during period.	Cost.	
		Lbs.	$ cts.	
May 16 to June 1	8 lbs. whole milk	720	7 20	
	12 lbs. skim-milk	1,080	1 62	
				8 82
June 1 to July 1	8 lbs. whole milk	1,440	14 40	
	12 lbs. skim-milk	2,160	3 24	
				17 64
July 1 to August 1	20 lbs. skim-milk	3,720	5 58	
	½ lb. cream equivalent	93	3 25	
				8 83
August 1 to Sept. 1	20 lbs. skim-milk	3,720	5 58	
	½ lb. cream equivalent	93	3 25	
	½ lb. bran and oil cake	93	0 93	
	2 lbs. hay	372	1 49	
				11 25
Sept. 1 to Oct. 1	10 lbs. skim-milk	1,800	2 70	
	½ lb. cream equivalent	90	3 15	
	½ lb. bran and oil cake	90	0 90	
	2 lbs. hay	360	1 44	
				8 19
Oct. 1 to Nov. 1	5 lbs. ensilage	930	0 93	
	½ lb. crushed oats	93	0 93	
	½ lb. bran and oil cake	93	0 93	
	2 lbs. hay	372	1 49	
				4 28
Nov. 1 to Dec. 1	10 lbs. roots	1,800	1 80	
	½ lb. crushed oats	90	0 90	
	½ lb. bran and oil cake	90	0 90	
	2 lbs. hay	360	1 44	
				5 04
				64 05

LIMITED GROWING RATION—SIX STEERS—CALVES.

Period 1900.	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
May 16 to June 1	920	1,010	90
June 1 to July 1	1,010	1,260	250
July 1 to August 1	1,260	1,540	280
August 1 to Sept. 1	1,540	1,805	265
Sept. 1 to Oct. 1	1,805	2,005	200
Oct. 1 to Nov. 1	2,005	2,220	215
Nov. 1 to Dec. 1	2,220	2,375	155

Total gain, May 16th to December 1st	1,455 lbs.
Weight at start	920 "
" finish	2,375 "
Daily rate of gain per steer	1·22 lbs.
Cost of 1 lb. gain	4·40 cts.
" feed per day per steer	5·39 "
" feed of lot, 198 days	$64 05

PIGS.

The herd of pigs at present on this farm consists of Yorkshires, Berkshires, Tamworths and their crosses, in all 60 head, as follows:—

1 Yorkshire boar, registered.
1 Yorkshire sow, registered.
1 Berkshire boar, registered.
1 Berkshire sow, registered.
1 Tamworth sow, registered.
5 Grade brood sows.
50 Grade pigs from one to five months old.

TEST OF DIFFERENT FEEDS FOR SWINE.

This experiment was carried on with a view to determine the comparative feeding value of the following feeds:—

1st, buckwheat; 2nd, shorts; 3rd, corn meal and crushed oats; 4th, pea meal and crushed oats; the last two mentioned being fed in the ratio of 2 to 1. This has been carried on during the past three years.

The pigs were put into the test at the age of 3 months, in lots of four, from the same litters, at their live weight, after fasting 14 hours.

The ration complete consisted of three pounds of the above mentioned feeds, and an average of five pounds of skim milk per pig per day. When ready for market, one pig was taken from each lot each time, and these were replaced by four from another litter.

Their gains were ascertained from their increased live weight, after fasting 14 hours.

They were dressed for market on the farm, and the percentage of dressed weight ascertained in each case.

PEN No 1.—Feed.—2 lbs. Corn Meal, 1 lb. Crushed Oats and Skim Milk.

No.	Breed.	Weight at start.	Weight at finish.	Net gain.	Number of days fed.	Daily gain.	Percentage of dressed weight.
1	Berkshire	96	170	74	60	1·23	79·21
2	Yorkshire	82	180	98	60	1·63	78·40
3	Tamworth	72	160	88	54	1·64	78·68
4	Yorkshire (D), Berkshire (S)	69	150	81	57	1·59	77·10
5	" "	65	151	86	61	1·40	77·60
6	" Tamworth (S)	65	169	104	58	1·79	81·25

PEN No. 2.—Feed.—2 lbs. Pea Meal, 1 lb. Crushed Oats and Skim Milk.

1	Berkshire	91	164	73	60	1·21	80·21
2	Yorkshire	87	178	91	60	1·51	80·2
3	Tamworth	82	190	88	54	1·62	79·64
4	Yorkshire (D), Berkshire (S)	77	154	77	57	1·35	78·1
5	" "	76	149	73	61	1·19	78·33
6	" Tamworth (S)	94	204	110	58	1·89	82·10

PEN No. 3.—Feed.—3 lbs. Shorts and Skim Milk.

No.	Breed.	Weight at start.	Weight at finish.	Net gain.	Number of days fed.	Daily gain.	Percentage of dressed weight.
1	Berkshire	100	168	68	60	1·13	80·32
2	Yorkshire	77	165	88	60	1·46	77·42
3	Tamworth	94	182	88	54	1·62	78·61
4	Yorkshire (D), Berkshire (S)	69	150	81	57	1·42	78·34
5	" "	73	152	79	61	1·29	79·34
6	" Tamworth (S)	81	198	117	58	2·01	81·40

PEN No. 4.—Feed.—3 lbs. Buckwheat and Skim Milk.

1	Berkshire	87	154	67	60	1·11	79·1
2	Yorkshire	84	175	91	60	1·51	78·43
3	Tamworth	79	161	82	54	1·51	79·63
4	Yorkshire (D), Berkshire (S)	78	153	75	57	1·31	77·46
5	" "	67	147	80	61	1·31	78·25
6	" Tamworth (S)	92	187	95	58	1·64	80·62

SHEEP.

The flock on this farm at present consists of:—

1 Pure bred Leicester ram.
5 Pure bred Leicester ewes.
6 Pure bred yearling Shropshire ewes.
6 Grade Shropshire ewes.

All are in fairly good condition.

POULTRY.

Four varieties of fowls were kept this year. Barred Plymouth Rocks, Black Minoreas, White Leghorns and White Wyandottes. The B. P. Rocks, B. Minoreas and W. Wyandottes were all young birds, and the W. Leghorns, with one exception, were old birds.

The pens were made up as follows:—

No. 1. 10 B. P. Rock hens.
No. 2. 7 B. Minorca hens.
No. 3. 6 W. Leghorn hens.
No. 4. 2 W. Wyandotte hens.

During the winter they were fed on a warm corn meal and shorts mash in the morning, and whole grain in the afternoon scattered on the floor of the pens. Water was before them all the time, and green ground bones and oyster shells were occasionally given them.

The eggs laid during the year by the different breeds were as follows:—

B. P. Rocks	450
B. Minoreas	400
W. Leghorns	268
W. Wyandottes	74

A 120-egg incubator was purchased from the T. A. Willetts Co., of Toronto, Ont., and one hatch taken off in May. One hundred and twenty eggs were put in.

At the end of 10 days, 38 eggs were found unfertile, and 64 chickens were hatched from the remaining 82 eggs. The chicks were very healthy, and none died.

The fowls now on hand are:—

	Cocks.	Cockerels.	Hens.	Pullets.
B. P. Rocks	1	4	5	5
B. Minoreas	1	..	4	1
W. Leghorns	1	3	5	7
W. Wyandottes	1	..	2	2

BEES

On December 5, 1900, four colonies of bees, weighing respectively 56½, 53, 52 and 44 pounds were put in winter quarters.

They were kept at a temperature ranging from 32° to 40° all winter, and put on their summer stands on April 17, 1901. The three swarming colonies then weighed 45, 40 and 40 pounds respectively, the other colony having died during the winter.

Although this season seemed to be favourable, the bees neither gave off many swarms, nor made much honey. One swarm was captured on July 2. They were put in their winter quarters this year on the 28th November, weighing 64, 60, 56 and 56 pounds respectively. No honey was taken from them this season.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. Blair.)

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith a report of some of the work done in the horticultural department of the Experimental Farm for the maritime provinces for the year 1901.

The spring opened up very early, making it possible to cultivate in parts of the orchard on the 19th of April. In May the temperature was moderate with but one frost on the 2nd of 6°. The average highest and lowest temperatures for the months of May, June, July, August and September for this year, as compared with 1900, are as follows:—

	Maximum.		Minimum.	
	1900.	1901.	1900.	1901.
May	55·9°	55·3°	36·3°	40·9°
June	68·°	69·8°	46·1°	48·9°
July	75·°	76·4°	54·°	54·1°
August	71 8°	75·7°	52·4°	54·9°
September	65·4°	68·2°	41·4°	43·7°

It will be seen that the season throughout has been decidedly warmer than last year. The temperature, especially for the month of September, continued uniformly high, and the season continued mild well along into October; the first frost occurring on October 8 of 1°, and the next October 22 of 10°.

The season, however, was extremely dry, but this did not injure the fruit crop with the exception of the raspberries and blackberries, which were almost a total failure. The apple trees made splendid growth and produced a medium crop of good fruit. The season has been noted for producing apples, the greater proportion of which were marketable. The apple scab was not so prevalent as usual, and the fruit that set matured in fine form.

The crop of apples is reported very light in many places. This seems to be the case especially where the trees have not been given proper attention in the past. I have noticed that orchards which have received good care gave a fair crop of fruit, while those adjoining which had received but little attention were without fruit at all. It is also said that in the Cornwallis and Annapolis valleys those who have paid particular attention to cultivating and fertilizing their orchards do not complain of the

season's fruit yield, while some whose orchards have been neglected are having but poor crops.

The Bordeaux mixture was used this year at the Nappan farm on all fruit trees. The apple scab fungus was more easily kept in check than usual, the weather continuing without any heavy rains made a less number of sprayings efficient. The plum aphis was the most troublesome pest to deal with. The most thorough work is necessary to kill all these insects, and several sprayings were required to rid the trees of this aphis. Tobacco water proves the cheapest and most effective material tried. The apple aphis, or apple plant louse, was also noticed on some apple trees, but only in small numbers.

The crop of cherries was very small, and outside of an English Morello and a few Orel trees no fruit was obtained. A few of the pear trees ripened fruit. The variety known as Osband's Summer gave some good specimens. The plum crop was very good. The plums which fruited well were Prince's Yellow Gage, Moore's Arctic, Saunders, Washington, Imperial Gage, German Prune and Italian Prune. The yield of strawberries was above the average.

The collection of annual flowering plants did not produce as fine bloom as usual owing to the dry weather. The perennial sorts gave splendid bloom. The ornamental trees and shrubs made good growth, and a report is here made of the varieties now growing at Nappan.

Experiments were conducted with vegetables of various kinds, and particulars of some of the tests will be found in this report.

I beg to acknowledge the following donations:—

Mr. A. M. Shaw, Stewiacke, N.S., cherry trees.
Mr. Leander Freen, Upper Malagash, N.S., cherry trees and Stark apple scions.
Peter Henderson & Co., New York, Prosperity peas and Metropolitan corn.
G. H. Haszard, Charlottetown, P.E.I., Cactus dahlias and King Edward VII. peas.

ORNAMENTAL TREES AND SHRUBS.

The ornamental trees and shrubs planted from time to time have made good growth during the past season. A list of those varieties now growing, the date of planting, their present growth, and the character of their growth is given in the following table.

There are 201 different sorts of deciduous trees and shrubs, and 56 kinds of evergreen trees and shrubs now growing on the farm. As far as possible the common names of these shrubs and trees are given, together with their botanical names. The botanical and common names used in the published catalogue of ornamental trees and shrubs growing at the Central Experimental Farm at Ottawa are used in this list.

Name of Variety.	When planted.	Present height.	Diameter of head.	Character of growth.	Remarks.
Deciduous.		Feet.	Feet.		
1 Acer platanoides—*Norway Maple*	1893	20½	11	Strong..	Fine ornamental tree.
2 Acer platanoides Schwedleri—*Schwedler's Maple*..	1897	9	5	" ..	Very fine.
3 Acer Saccharinum—*Sugar or Rock Maple*	1892	13	7½	" ..	Valuable ornamental tree.
4 Acer Negundo—*Box Elder*..	1892	13	10½	" ..	A fine rapid grower.
5 Acer tataricum Ginnala—*Ginnalian Maple*	1892	9	8	" ..	Valuable shrub when young.
6 Acer pseudoplatanus—*Sycamore Maple*	1897	5½	4½	Fair....	Not thrifty.

Name of Variety.	When planted.	Present height.	Diameter of head.	Character of growth.	Remarks.
7 Acer pennsylvanicum—*Striped Maple*	1899	5½	4	Strong..	Very good.
8 Acer platanoides Reitenbachi	1887	9½	5½	" ..	"
9 Acer pseudo-platanus Worleei	1897	6	5	Fair....	"
10 Acer Monspessulanum—*Montpellier Maple*	1897	3½	4	" ..	A low growing maple.
11 Æsculus turbinata—*Variegated Horse Chestnut*	1900	1	.....	" ..	
12 Alnus glutinosa imperialis—*Imperial Cut-leaved Alder*	1897	8	7	Strong..	Top kills back in winter.
13 Alnus cordifolia—*Heart-leaved Alder*	1899	4	4	Fair....	" "
14 Aristolochia Sipho—*Dutchman's Pipe*	1899	1½	.....	" ..	Makes strong growth.
15 Artemisia abrotanum—*Southernwood*	1894	4	5½	Strong..	A useful shrub.
16 Berberis Thunbergi—*Thunberg's Barberry*	1893	4	5½	" ..	Fine dwarf Barberry.
17 Berberis Aquifolium—*American Holly*	1897	2	3½	" ..	Very fine.
18 Berberis Sieboldii—*Siebold's Barberry*	1897	3	3½	" ..	"
19 Berberis Amurensis—*Amur Barberry*	1898	3	3¼	" ..	Fair.
20 Berberis Hybrid No. 2	1899	2¾	2½	" ..	Rapid grower.
21 Berberis Spathulata	1900	1	.....	" ..	
22 Betula alba—*European White Birch*	1900	27	16	" ..	Fine ornamental tree.
23 Betula alba pendula Youngi—*Young's Weeping Birch*	1899	4½	4	" ..	Very fine.
24 Betula alba purpurea—*Purple-leaved Birch*	1897	10½	6½	" ..	"
25 Betula pumila—*Low Birch*	1901	1½	2	" ..	
26 Betula alba fastigiata—*Pyramidal Birch*	1897	15	6	" ..	A valuable variety.
27 Betula alba laciniata pendula—*Cut-leaved Birch*	1899	4½	3	" ..	Very fine.
28 Calycanthus floridus—*Carolina Allspice*	1899	2	1½	Fair....	Very good.
29 Caragana arborescens—*Siberian Pea Tree*	1891	7	8	Strong..	Very good, in full bloom June 10.
30 Caragana pygmæa—*Dwarf Caragana*	1898	2½	2½	" ..	Very good.
31 Caragana frutescens—*Woody Caragana*	1897	4	3	" ..	A fine variety.
32 Carpinus Caroliniana—*Blue Beech*	1899	1½	1	Weak ..	
33 Catalpa Cordifolia	1900	3	1½	Strong .	Kills back.
34 Catalpa Kaempferi	1901	2	1	" ..	"
35 Celastrus Articulatus—*Japanese Bitter-sweet*	1899	5½	4½	" ..	Climber.
36 Celastrus Scandens—*Climbing Bitter-sweet*	1899	5½	3	" ..	"
37 Cephalanthus occidentalis—*Button Bush*	1898	2	2	Weak ..	
38 Cercidiphyllum Japonicum—*Katsura Tree*	1897	2¾	2	Fair....	Very fine.
39 Clematis Vitalba—*Common Traveller's Joy*	1899	8	.....	Strong..	Good climber.
40 Clematis Viticella	1899	6½	.....	" ..	"
41 Clematis Montana—*Mountain Clematis*	1900	10	.....	" ..	"
42 Cornus sanguinea—*Red-branched Dogwood*	1898	3½	4	" ..	Very good.
43 Cornus alba sibirica variegata—*Variegated Dogwood*	1898	3	3½	" ..	Very fine.
44 Cornus Baileyi	1897	5½	5	" ..	"
45 Cornus Amomum	1897	3½	4	" ..	
46 Cornus Spaethii	1899	1½	1	Fair....	
47 Cornus Mascula Variegata—*Variegated Cornelian Cherry*	1899	1½	½	Weak ..	
48 Cornus sanguinea elegantissima	1899	1½	1	Fair....	
49 Cotoneaster tomentosa—*Common Cotoneaster*	1898	3	5	Strong..	Very good.
50 Cotoneaster Acutifolia—*Sharp-leaved Cotoneaster*	1895	3	4	" ..	"
51 Cotoneaster laxiflora	1899	3½	5	" ..	Very fine.
52 Crataegus tomentosa—*Black Haw*	1897	3	4	" ..	"
53 Crataegus Oxyacantha flore rubro pleno—*Double red-flowering White Thorn*	1899	2½	1½	Fair....	"
54 Cytisus purpureus	1897	1½	2	Strong..	Full bloom June 15.
55 Cytisus triflorus	1898	1	3	" ..	Very fine.
56 Daphne Mezereum	1901	½	.....	Weak ..	
57 Deutzia hybrida Wellsii	1894	2½	2½	Fair....	Full bloom July 12.
58 Deutzia gracilis variegata	1898	1½	1½	Weak ..	
59 Deutzia gracilis	1899	1	1	" ..	
60 Diervilla hortensis A. Carrière	1897	4	4½	Strong..	Winter kills slightly.
61 Diervilla florida Stelznerii	1897	4	4	" ..	"
62 Diervilla Candida—*Weigela Candida*	1898	4	5	" ..	"
63 Diervilla florida—*Weigela Rosea*	1894	4½	5	" ..	"
64 Diervilla florida alba—*Weigela Rosea Alba*	1892	4½	5	" ..	Winter kills slightly.
65 Diervilla hybrida Aurea—*Weigela Aurea*	1894	1½	1½	Fair....	Winter kills badly.
66 Elæagnus Argentea—*Wolf Willow*	1899	3½	2	Strong..	Valuable.
67 Euonymus Americanus—*Spindle Tree*	1897	4	2	" ..	Valuable.

	Name of Variety.	When planted.	Present height.	Diameter of head.	Character of growth.	Remarks.
			Feet.	Feet.		
68	Forsythia suspensa—*Golden Bell*	1899	3	3½	Fair....	Very fine.
69	Forsythia variegata—*Variegated Golden Bell*	1899	2½	2	"	"
70	Fraxinus Americana—*White Ash*	1890	24	18	Strong..	Valuable tree.
71	Genista tinctoria Sibirica—*Siberian Green-weed*	1899	1	2½	" ..	Very fine.
72	Gleditschia triacanthos—*Honey Locust*	1898	3	3	" ..	"
73	Hamamelis Virginica—*Witch Hazel*	1901	2½	2	Fair....	Valuable.
74	Hippophæ rhamnoides—*Sea Buckthorn*	1899	2	1½	"	Very fine.
75	Hydrangea paniculata	1897	5	5	Strong..	"
76	Juglans cinerea—*Butternut*	1890	12	8	" ..	Valuable tree.
77	Juglans Sieboldiana—*Japanese Walnut*	1898	5	1	Weak ..	
78	Ligustrum Amurense—*Amur Privet*	1895	5	5	Strong..	Fine shrub.
79	Ligustrum vulgare aureum—*Golden Privet*	1899	1½	1½	" ..	Very fine.
80	Ligustrum Ibota	1897	4½	4	" ..	Bloom July 20.
81	Ligustrum sinense	1897	4½	4	" ..	Very fine.
82	Ligustrum ovalifolium variegata—*Variegated California Privet*	1897	3½	3	Fair....	"
83	Liriodendron tulipifera—*Tulip Tree*	1897	4	3	Strong..	Kills back, slightly.
84	Lonicera Chrysantha—*Amur Bush Honeysuckle*	1892	10	7	" ..	Very good.
85	Lonicera tatarica flore rubro—*Tartarian Bush Honeysuckle*	1894	7	8	" ..	"
86	Lonicera Alberti—*Albert Regel's Honeysuckle*	1898	2	3½	" ..	Very fine.
87	Lonicera hirsuta—*Hairy Honeysuckle*	1901	1	.....	" ..	
88	Lonicera cærulea graciliflora	1899	3½	3	" ..	Very good.
89	Lonicera Periclymenum—*English Honeysuckle*	1899	5	...	" ..	Good climber.
90	Lycium Chinense—*Matrimony Vine*	1899	3	1½	" ..	Very fine.
91	Menispermum dauricum—*Moonseed*	1898	5	.....	" ..	Climber.
92	Periploca græca	1900	2	.....	" ..	"
93	Philadelphus hybridus Lemoinei—*Mock Orange*	1898	2	2	" ..	Very fine.
94	Philadelphus nivalis spectabilis plenus	1899	1	1	Fair....	
95	Philadelphus inodorus speciosus grandiflorus	1897	5	4½	Strong..	Bloom July, very fine.
96	Philadelphus hybridus Lemoinei—*Boule d'Argent*	1900	1½	1	Fair....	
97	Philadelphus Dentziæflorus	1898	2	1½	Strong..	Very fine.
98	Philadelphus coronarius	1897	4	4	" ..	"
99	Philadelphus grandiflorus—*Large-flowered Mock Orange*	1898	2½	2½	Fair....	"
100	Philadelphus hirsutus	1899	1½	1	"	
101	Philadelphus Keteleerii flore pleno	1901	½	.....	"	
102	Philadelphus cordifolius	1900	1	1	"	
103	Philadelphus nivalis	1899	1	1½	"	
104	Populus alba pyramidalis—*Silver Poplar*	1891	20	6	Strong..	Very fine.
105	Populus certinensis	1890	38½	18	"	Very rapid growth.
106	Populus nigra pyramidalis—*Lombardy Poplar*	1891	37	8½	"	Valuable tree.
107	Populus deltoidea aurea—*Van Geert's Poplar*	1899	3½	2	"	Very fine.
108	Potentilla fruticosa—*Shrubby Cinque-foil*	1897	4	5	Strong..	Very good.
109	Prunus pissardi—*Purple-leaved Plum*	1897	5½	5	" ..	Very fine.
110	Prunus Japonica flore roseo pleno	1897	3½	2½	" ..	
111	Prunus demissa—*Western Wild Cherry*	1900	4½	2½	" ..	
112	Prunus Simonii	1897	3	2	Fair....	
113	Prunus Maritima—*Beach Plum*	1901	1½	2	Strong..	Very fine.
114	Prunus Pumila—*Sand Cherry*	1899	2	2½	" ..	
115	Prunus Maximowiczii	1899	3½	2	" ..	
116	Ptelea trifoliata aurea—*Golden Wafer Ash*	1897	4	5	" ..	Very fine.
117	Pyrus Aucuparia—*European Mountain Ash*	1892	20	10	" ..	Valuable tree.
118	Pyrus Sorbus—*Service Tree*	1897	6½	3	" ..	Very fine.
119	Pyrus Japonica rosea alba—*Japanese Quince*	1898	3	2½	Fair.. .	"
120	Pyrus sinensis	1900	3½	3	Strong..	
121	Pyrus Maulei—*Maule's Japanese Quince*	1899	2	2	" ..	"
122	Prunus Serotina—*Wild Black Cherry*	1898	5½	5½	" ..	Very good.
123	Quercus Coccinea—*Scarlet Oak*	1897	8	4	" ..	Very fine.
124	Quercus pedunculata—*European Oak*	1892	20	12	" ..	"
125	Japan Oak	1899	2	1½	" ..	
126	Rhamnus tinctoria—*Buckthorn*	1897	5½	3	" ..	Valuable tree.
127	Rhamnus Cathartica—*Common Buckthorn*	1897	6	5	" ..	"
128	Rhus Cotinus—*Smoke Tree*	1898	2½	3	" ..	Very fine.
129	Rhus Coriaria—*Staghorn Sumach*	1897	8	5½	" ..	"
130	Rhus Cotinus atropurpurea	1899	1½	1	" ..	"

	Name of Variety.	When planted.	Present height.	Diameter of head.	Character of growth.	Remarks.
			Feet.	Feet.		
131	Ribes aureum—*Missouri Currant*	1892	7½	7	Strong..	Full bloom June 5.
132	Ribes diacantha—*Siberian Currant*	1897	4	2½	" ..	Valuable.
133	Ribes aureum tenuiflorum	1898	3	3	" ..	"
134	Ribes gordonianum	1900	1½	1	" ..	
135	Robinia hispida—*Rose Acacia*	1898	3	3½	" ..	Full bloom June 15,
136	Rosa rubiginosa—*Sweetbriar*	1901	1½	1	" ..	Valuable.
137	Rosa rugosa—*Japanese Rose*	1897	3	3½	" ..	Very fine.
138	Rosa ferruginea—*Purple-leaved Rose*	1897	6	5	" ..	Very good.
139	Rosa centifolia—*Cabbage or Provence Rose*	1893	3	4	" ..	"
140	Salix alba argentea—*Silvered White Willow*	1898	5	4½	" ..	
141	Salix aurea pendula	1900	6	5	" ..	Very fine.
142	Salix rosmarinifolia—*Rosemary-leaved Willow*	1898	5	4½	" ..	
143	Salix Voronesh—*Voronesh Willow*	1900	6	5	" ..	Valuable.
144	Sambucus nigra pyramidalis—*Pyramidal Elder*	1897	4	2	" ..	
145	Sambucus nigra foliis aureis—*Golden-leaved Elder*	1897	4	4	" ..	Very fine.
146	Sambucus nigra laciniata—*Cut-leaved Elder*	1897	5½	5	" ..	Very good.
147	Sambucus nigra pulverulenta alba	1897	3½	3½	" ..	
148	Sambucus nigra fol. argenteis variegatis	1897	2½	3	" ..	Very fine.
149	Sambucus nigra fol. aureis variegatis—*Golden Elder*	1897	3	4½	" ..	"
150	Sophora Japonica	1897	6	5	" ..	"
151	Spiræa arguta	1899	4½	4	" ..	Very fine,.
152	Spiræa callosa alba	1894	2¾	4	" ..	Very fine.
153	Spiræa vaccinifolia—*Vaccinium-leaved Spiræa*	1899	4½	2½	Fair....	Valuable.
154	Spiræa Chamædrifolia—*Germander-leaved Spiræa*	1897	4	3	Strong..	"
155	Spiræa callosa rosea	1898	3	2½	" ..	"
156	Spiræa sorbifolia	1897	2½	2½	" ..	Bloom July 20.
157	Spiræa Van Houttei—*Van Houtte's Spiræa*	1894	5½	5½	" ..	Very fine.
158	Spiræa discolor—*White-beam-leaved-Spiræa*	1897	5½	5½	" ..	Valuable.
159	Spiræa salicifolia floribus alba—*Meadow Sweet*	1897	5½	3¾	" ..	"
160	Spiræa Thunbergi—*Thunberg's Spiræa*	1897	3½	3½	" ..	Very fine.
161	Spiræa salicifolia floribus rosea—*Red-Meadow Sweet*	1897	5½	4	" ..	Valuable.
162	Spiræa callosa macrophylla	1897	5	4	Strong..	Full bloom July 15.
163	Spiræa callosa superba	1898	2	2½	" ..	Very good.
164	Spiræa japonica Bumalda—*Spiræa Bumalda*	1898	2½	2	" ..	Valuable.
165	Spiræa japonica alba—*White Japanese Spiræa*	1901	1½	1	Fair....	"
166	Spiræa bracteata aurea	1899	1½	1	" ...	Very fine.
167	Spiræa douglasi	1892	5	5	Strong..	
168	Spiræa notha	1897	4½	4	" ..	
169	Spiræa notha aurea—*Golden-leaved Spiræa*	1897	4½	4½	" ..	Very fine.
170	Spiræa japonica rubra—*Red Japanese Spiræa*	1892	2	2	Fair....	Valuable.
171	Syringa villosa	1897	6½	5	Strong..	Very fine.
172	Syringa japonica—*Japan Lilac*	1897	6	4½	" ..	"
173	Syringa josikæa—*Josika's Lilac*	1894	7½	7	" ..	Full bloom June 20.
174	Syringa vulgaris purpurea—*Common Purple Lilac*	1892	7	7	" ..	" " 8
175	Syringa vulgaris alba—*White Lilac*	1894	8	5	" ..	Very fine.
176	Syringa vulgaris Beranger	1897	3½	2	Fair....	"
177	Syringa vulgaris cœrulea superba	1897	3	2	" ...	"
178	Syringa persica laciniata—*Cut-leaved Persian Lilac*	1897	2½	2½	" ...	"
179	Syringa vulgaris nigricans	1897	3½	2½	" ..	Valuable.
180	Syringa vulgaris congo	1901	¾	.....	" ...	
181	Syringa vulgaris Gloire de Croncells	1897	3	2½	" ...	
182	Syringa vulgaris rubra insignis	1897	4	2½	Strong..	
183	Syringa vulgaris rubra plena	.....	.....	.....	.....	
184	Syringa vulgaris President Grevy	1901	½	.....	Fair.. .	
185	Syringa persica—*Persian Lilac*	1897	3½	3½	Strong..	"
186	Syringa vulgaris Marie Legraye	1901	½	.....	" ..	
187	Syringa vulgaris Rouge de Marley	1897	3½	3	" ..	Very fine.
188	Syringa vulgaris Mathieu de Dombasle	1897	2½	2	Weak ..	
189	Syringa vulgaris Lemoinei	1901	½	.....	" ...	
190	Syringa vulgaris Madame Lemoine	1901	½	.....	" ...	
191	Syringa vulgaris Chas. X	1899	2½	2	Strong..	"
192	Tamarix amurensis—*Amur Tamarisk*	1897	6½	3½	" ..	Winter kills a little.
193	Tilia platyphyllos—*Broad-leaved Linden*	1892	10	12	" ..	Very fine.
194	Ulmus Americana—*American Elm*	1891	16	12	" ..	Valuable tree.
195	Ulmus racemosa—*Cork or Rock Elm*	1894	6	3½	" ..	Valuable.

Name of Variety.	When planted.	Present height.	Diameter of head.	Character of growth.	Remarks.
		Feet.	Feet.		
196 Viburnum opulus—*High Bush Cranberry*	1891	6½	5½	Strong..	Very fine.
197 Viburnum opulus sterile—*Snow-ball*	1898	5	4½	" ..	"
198 Viburnum Lantana—*Wayfaring Tree*	1894	8	6¾	" ..	Valuable.
199 Viburnum prunifolium—*Black Haw*	1899	2½	2	Fair....	"
200 Vitis quinquefolia—*Virginia Creeper*	1892	.....	.....	Strong..	Best climber.
201 Vitis Thunbergii	1899	2½	.. ...	Weak ..	Kills back.
Conifers.					
1 Abies subalpina	1901	1½	1	Fair....	
2 Abies balsamea—*Balsam Fir*	1893	6½	6	Strong..	
3 Abies concolor—*One Coloured Fir*	1901	3	3	" ..	Very fine.
4 Cupressus Lawsoniana—*Lawson's Cypress*	1897	2½	4½	" ..	Very good.
5 Cupressus pisifera—*Retinospora pisifera*	1897	3½	5	" ..	Very fine.
6 Cupressus pisifera aurea—*Golden Retinospora*	1892	4	4½	" ..	"
7 Cupressus pisifera filifera—*Retinospora filifera*	1894	4	5½	" ..	"
8 Cupressus pisifera plumosa—*Plumose Retinospora*	1893	6	4½	" ..	"
9 Cupressus pisifera plumosa aurea—*Golden Plumose Retinospora*	1898	3	2½	" ..	"
10 Retinospora Leptoclada	1899	1½	1	Fair....	
11 Cupressus obtusa viridis—*Green obtuse Cypress*	1899	1	½	Weak ..	
12 Juniperus chinensis—*Chinese Juniper*	1898	2½	2	Fair....	"
13 Juniperus communis suecica—*Swedish Juniper*	1898	3½	2½	Strong..	"
14 Juniperus sabina—*Common Savin Juniper*	1897	1½	4	" ..	"
15 Juniperus communis—*Common Juniper*	1894	5	4½	" ..	"
16 Juniperus elegans—*Elegant Virginian Juniper*	1898	3½	3	" ..	"
17 Juniperus sinensis variegata—*Variegated Savin*	1899	1	½	" ..	"
18 Juniperus communis aurea—*Golden Juniper*	1899	1	½	Weak ..	
19 Juniperus chinensis aurea—*Golden Chinese Juniper*	1899	1	½	" ..	
20 Juniperus Virginiana—*Red Cedar*	1891	8	5	Strong..	"
21 Larix Europaea—*European Larch*	1890	27	16	" ..	
22 Picea alba—*White Spruce*	1894	7½	6	" ..	
23 Picea excelsa—*Norway Spruce*	1893	20½	11	" ..	
24 Picea nigra—*Black Spruce*	1895	8	6½	" ..	
25 Picea pungens—*Rocky Mountain Blue Spruce*	1892	13	8	" ..	"
26 Picea obovata schrenkiana	1900	1	.....	Fair....	
27 Picea alba variegata Aurea—*Golden White Spruce*	1901	1	. . . .	"	
28 Picea Parryana glauca	1900	1	.....	"	
29 Picea alba variegata	1900	1	.....	"	
30 Picea alba pyramidalis	1899	1	½	Strong..	"
31 Picea excelsa Remontii	1899	1½	1	" ..	"
32 Picea alcockiana—*Alcock's Spruce*	1900	1	1½	" ..	"
33 Pinus Cembra—*Stone Pine*	1896	4½	3	" ..	"
34 Pinus montana Mughus—*Dwarf Mountain Pine*	1892	4½	6	Strong..	Very fine.
35 Pinus ponderosa—*Heavy Wooded Pine*	1899	2½	2	Fair....	
36 Pinus Strobus—*White Pine*	1892	10	6½	Strong..	"
37 Pinus sylvestris—*Scotch Pine*	1890	20	13	" ..	Valuable tree.
38 Pinus Laricio nigricans—*Austrian Pine*	1894	11	9	" ..	"
39 Pseudotsuga Douglasii—*Douglas' Spruce*	1898	5½	4	" ..	Very fine.
40 Taxodium distichum—*Bald Cypress*	1897	2	3¼	" ..	"
41 Thuya occidentalis—*White Cedar, Arbor-vitae*	1893	10	7	" ..	Valuable.
42 Thuya occid. variegata—*Variegated Arbor-vitae*	1899	2	1	" ..	Very fine.
43 Thuya occid. pyramidalis—*Pyramidal Arbor-vitae*	1897	5½	2	" ..	"
44 Thuya occid. compacta—*Compact Arbor-vitae*	1894	4½	5½	" ..	"
45 Thuya occidentalis globosa—*Globose Arbor-vitae*	1897	2½	2	" ..	"
46 Thuya occidentalis Hoveii—*Hovey's Arbor-vitae*	1897	3	2½	" ..	"
47 Thuya ericoides	1898	3	3	" ..	"
48 Thuya occidentalis pumila	1898	2	2	" ..	
49 Thuya occid. elwangeriana—*Elwanger's Arbor-vitae*	1897	3	4	" ..	"
50 Thuya occidentalis vervaenana	1897	3½	3	" ..	"
51 Thuya occidentalis Hoveii aurea—*Hovey's Golden Arbor-vitae*	1898	2	1½	" ..	"
52 Thuya occidentalis Meehani aurea—*Meehan's Golden Arbor-vitae*	1898	2	2	Fair....	"
53 Thuya occidentalis lutea—*Yellow Arbor-vitae*	1899	¾	.....	"	"
54 Thuya occidentalis pygmaea	1899	½	....	" . . .	
55 Thuya occidentalis Columbia	1900	1	.....	"	
56 Tsuga canadensis—*Hemlock*	1892	4	6	Strong..	"

STRAWBERRIES.

Experiments were conducted this season with 41 varieties of strawberries. The plots were each 99 square feet. The plants for each plot were set in the spring of 1900 in two rows, each 3 feet apart and 16½ feet long. They were set one foot apart in the rows. A space of 5 feet was left between the plots when planted so that when the runners were formed each plot was 6 feet wide and 16½ feet long of matted plants with a good space between each plot which was kept cultivated.

We seldom take more than one crop off the plants grown in the matted row system. This season, however, the fruit was picked from those plots planted in the spring of 1899. The yield, however, was not large. It was found impossible to keep the weeds out of these older plots without much extra labour, and it was thought that the fruit would not warrant the outlay, consequently the plots were allowed to remain weedy. The berries picked were small, and the yield on many did not much more than pay for the expense of picking. Some, however, yielded a fair amount of good fruit. There was no expense incurred in this instance, except that of covering the plants during winter. It seldom pays to put expense in the way of labour and fertilizers on old plots, but it is often advisable where plenty of land is available to let the plants remain for the second crop.

The land on which the main crop was grown was a clay loam, and was manured in the fall of 1899 with 20 tons of stable manure per acre. This was ploughed under in the fall, and in the spring of 1900 was worked up and complete fertilizer at the rate of 400 pounds per acre sown broadcast and harrowed in. The plants were set on the level, May 17.

The usual straw protection was not given the plants in November, and a heavy snowstorm the 5th of December covered the plants completely. This remained on until the last of March when it was thought advisable to give a light covering of straw to the new plots, but the old beds were allowed to go without protection and all came through in good condition. Notes taken on this point from year to year would indicate that only in one winter in three will the plants stand the winter without protection, and hence it is not safe to allow the plants to go without such protection.

The dates of picking and quantity of fruit obtained each day are given in the following table. The dates of picking and yield obtained from the old plots are also given. Several new varieties received from the Central Experimental Farm were added to the list this year, including Afton, P.; Nick Ohmer, B.; Clyde, B.; Senator Dunlap, B.; Glen Mary, B., and Buster, P.

STRAWBERRIES—TEST OF VARIETIES.

Name of Variety.	Sex.	Date of Picking—July.										Total Yield from plot of 99 sq. ft.	
		3rd.		6th.		9th.		12th.		15th.		20th.			
		Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.
Bisel	P	1	4	4	4	11	8	13		7	15	2	1	40	
Beverly	B	2	12	5		4	2	14	1	6	5	1		33	4
Barton's	P	3	2	6	14	6		9	4	4	12	2	2	32	2
Beder Wood	B	6		4	3	10	13	9		2	2	2	1	34	3
Brandywine	B	1		1	2	3	14	4	2	2	7	3	9	16	2
Bubach	P	9	1	9	15	11		6	2	3	6	.....		39	8
Capt. Jack	B	6	1	8		5	11	4		7	8	1		32	4
Chairs	B		8	2		2	7	4	9	3	8	4	1	17	1
Crescent	P	4		8	1	5	15	7	6	5	1	1	9	32	
Enhance	B		4	3	2	3	4	7	2	6		4	1	23	13
Equinox	B	.....		2		1	12	2		4	12	2		12	8
Eureka	P	.....		2	1	3	7	13		5	2	1	14	25	8
H. W. Beecher	B	3	1	4	13	12	2	4		5	8	2		31	8
Haverland	P	5		4	7	9	9	7	1	7	1	1	8	34	10
Jas. Vick	B	1		5	2	9	14	9	6	4	6	4	12	34	8
John Little	B	4	1	3	7	6	9	3	15	8	2	2		28	2
Lovett	B	6	2	5	12	13	2	6		4		1		36	
Otsego	P		4	2	10	4	2	10		5	2	5	15	28	1
Paris King	B	5	5	4	11	4		1	8	2			4	17	12
Pearl	P	4	2	6	12	5	2	5	8	3	4	.....		24	12
Parker Earle	P	4		3	2	7	14	7		3	2	5	15	31	1
Princess	B	7	8	6	8	7	2	4	12	3	2	1		30	
Shirts	B		4	1	8	4		3	7	6	9	1	2	16	14
Sharpless	B		12	3	8	4	6	6	8	2	2	1		18	4
Swindle	B		4	1		4	6	9	5	6	8	7	5	28	12
Seneca Queen	B		8	3		7	5	9	11	5	8	1		27	
Thompson's Late	P	9	8	4		1	6	.....		.....		.....		14	14
Wm. Belt	B	.....		.....		8	2	8	1	4	5	5	4	25	12
Warfield No. 2	P	4		8	5	13	5	12	6	4	8	5		47	8
Wilson	B	3	2	4	12	8	2	6	8	7		1	12	31	4
Williams	B	2		2		8	5	4	11	2	8	1		20	8
Tennessee Prolific	B	2	2	7	12	4	12	9	8	6		1	8	31	10
Jessie	B	1		1		4	3	7	2	2	8	2	4	18	1
Ada	P	3	5	5	2	3	1	4	8	3		1		20	
Greenville	P	1	3	5	5	15	8	10		6	2	3	14	42	
Gandy	B	2		5	3	9	13	5	8	3		2	4	27	12
Cossett	P		12	5	8	4	3	3	9	3	9	.....		17	9
Mary	P	1		2	12	5	2	4	6	1	12	2	8	17	8
Saunders	B	2		1	4	7	12	14	8	7		3		35	8
1001	B	2	2	1	10	4		4	8	4		6		22	4

STRAWBERRIES—TEST OF VARIETIES.

OLD PLOTS.

Name of Variety.	Date of Picking—July.										Total Yield from Plot.	
	2nd.		4th.		7th.		12th.		15th.			
	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.	Lbs.	oz.
Brandywine		8	1	4	2	3	.....		1	2	5	1
Bisel	1	2	2	12	7	6	8	3	.....		19	7
Beverly		4	2	3	4	2	7	8	.....	..	14	1
Beder Wood	1		2	8	5	2	5	1	1	6	15	1
Barton's	1	8	3	5	6	2	4	7	1		16	6
Bubach	2	2	4	7	4	11	3	6	.....		14	10
Capt. Jack	1	8	1	3	2	12	1	9	1	8	8	8
Clark's Early	1	8	1	8	1	2	1	5	.....		5	7
Chairs	1	4	1		1	8	1	4	.....		5	
Crescent	3		2	7	7	4	1	6	.....		14	1
Enhance		8	1	4	1	8	.....		.....		3	4
Eureka	.....		.....		2	4	3	7	.....		5	11
Equinox	.....		.....		.....	..	1	4	2	6	3	10
Gandy	....	...	1	12	4		2	8	1	4	9	8
Greenville		12	1	4	4	12	3	14	.....		10	10
H. W. Beecher	1	8	1	7	4	14	5	2	.....		12	15
Haverland	2	1	2	3	4	6	3	1	2		13	11
Jas. Vick		12	2		6		5	8	1	2	15	6
John Little	1	8		8	2	3	.....		1		5	3
Lovett	2		1	5	3	7	.....		.....		6	12
Otsego		4	1		7	7	6	3	.....		14	14
Paris King	2	12	1		2		.....		1	4	7	
Pearl	1		1	8	1	13	1	4	.....		5	9
Parker Earle	1	2	1	11	.....		2	14	.....		5	11
Shirts	..	..	.....		1	15	2	6	...	....	4	5
Sharpless	2	4	2	1	4	11	4	2	1	8	14	10
Swindle		4	3	11	2	5	2		.....		10	10
Seneca Queen	1		1		4	8	4	2	.....		10	10
Wm. Belt		2	1	11	2	14	5	7	1	2	11	4
Warfield	3	12	3		2	7	4	2	.....		13	5
Wilson	1		3	7	2	12	1	2	.....		8	5
Williams	1	8	2		2	14	2	4	1	8	10	2
Tennessee Prolific		8	2		1	8	1	6	.....		5	6

GOOSEBERRIES.

The gooseberries have never made a strong growth, especially the English varieties. The soil is a heavy clay loam which dries out considerably in the summer. The gooseberry mildew which we have been able heretofore to control fairly well has this season been almost impossible to keep in check. The crop of all the English varieties, except Whitesmith and Industry, was ruined, and the yield of fruit was not large.

The English varieties of gooseberries while much larger than the American sorts are not regarded here as of much better quality, and the latter are much more vigorous here. The Red Jacket is an exceptionally fine variety. It together with Downing are two of the best sorts grown here. The Houghton is a large yielder, and the fruit is of good quality, but is small. The Whitesmith is the best of the fourteen varieties of English gooseberries tested. The common practice seems to be to pick this fruit long before it has commenced to ripen. Its quality for preserving is in our opinion greatly improved when allowed to partially ripen before picking.

EXPERIMENTS WITH GOOSEBERRIES.

Name of Variety.	Number of Plants.	Yield in 1900.	Number of Plants.	Yield in 1901.
		Lbs.		Lbs.
Smith's Improved	6	13½	6	6¾
Downing	6	15½	6	9⅓
Houghton	6	17	6	9¾
Red Jacket	6	16¼	6	5¾
Whitesmith	6	14½	6	4¾
Industry	6	12½	6	3¼

RED AND WHITE CURRANTS.

Eight varieties of red and two varieties of white currants fruited this season. They were grown in rows 6 feet apart and 5 feet apart in the rows. The soil on which they were grown was a heavy clay. The bushes are vigorous growers, and some of them were quite productive.

EXPERIMENTS WITH RED AND WHITE CURRANTS.

Name of Variety.	Number of Bushes.	Yield of Bushes.	Remarks.
		Lbs.	
North Star	3	13¾	Small; fair quality.
Pomona	3	8¼	Large "
Cherry	3	6¾	Very large; fair quality.
Fay's Prolific	3	6½	" "
Red Dutch	3	16¼	Small; fair quality.
Knight's Early Red	3	2¾	" excellent quality.
La Fertile	3	5	" "
Wilder	3	12¼	" fair quality.
White Dutch	3	10½	" "
White Imperial	3	8¾	Large "

GRAPES.

Fourteen varieties of grapes fruited this year. These were planted in the spring of 1897 on a clay loam. They were set in a row six feet apart. The vines run on a trellis made of wire attached to posts. They have always been laid down for winter, with the exception of the past winter, when they were left unprotected and came through the season in good condition. They fruited for the first time this year.

EXPERIMENTS WITH GRAPES.

Name of Variety.	When Ripe.	Colour of Fruit.	Remarks.
Florence	Sept. 23..	Black	Fair quality ; vigorous.
Lady	Oct. 4..	White	Good quality "
Moyre's Early	" 4..	Black	Fair quality ; fairly vigorous.
Moyer	" 4..	Bright red	Good quality ; vigorous.
Telegraph	" 4..	Black	" fairly vigorous.
Lindley	" 10..	Red	" vigorous.
Hayes	" 10..	White	" "
Worden	" 10..	Black	" fairly vigorous.
Barry	" 16..	"	Poor quality ; vigorous.
Bacchus	" 16..	"	" "
Moore's Diamond	" 16..	Greenish white	Good quality ; vigorous.
Herbert	" 18..	Black	" "
Vergennes	" 23..	Bright red	Did not ripen ; vigorous.
Roger's No. 17	" 23..	Blue black	" "

RHUBARB.

Five varieties of rhubarb were grown in rows six feet apart each way. The soil was a heavy clay loam and the crop is not early on such ground. The advantage in favour of a light but loamy soil for this plant is very great, as the early crop generally realizes double the price that is obtained a few days later. The plants were manured in the fall with well rotted manure which was dug in around the plants as early in the spring as possible. We have found that August is the best time for dividing and re-setting roots, which should be done every four or five years.

The variety, Carleton Club, is a very large growing variety, and should be more widely known. Mitchell's Royal Albert is also very large, but late. The yield obtained from four plants was as follows:—

Name of Variety.	When Pulled.	Yield from four Plants.
		Lbs.
Paragon	May 21	22
Linnaeus	" 21	32
Victoria	" 21	24
Carleton Club	" 27	46
Mitchell's Royal Albert	June 3	21

LIME WASH FOR THE OYSTER-SHELL BARK LOUSE.

This mixture was prepared by slacking fresh lime in water and adding more water to make it of the strength desired. One experiment was made with the mixture in the proportion of 1 pound of lime to 1 gallon of water, and another with 2 pounds of lime to 1 gallon of water. The trees treated in this experiment were young, only 2 years planted, which were badly covered with the bark louse. They were in a neighbouring orchard.

The wash made of 1 pound of lime to a gallon of water was not nearly so effective as the one where 2 pounds of lime was used. On the trees where the latter mixture was used the scales were over three-quarters killed. If this is used in the fall as advised by Mr. W. T. Macoun, horticulturist of the Central Farm, there is no doubt but

that it will be still more effective. It is a cheap and efficient remedy for this troublesome pest. The spraying was done March 26, and two sprayings were given each tree on that date.

The lime should be slacked with hot water, enough being used to well cover the lime. As soon as slacked pour in cold water and stir until the whole mass is thoroughly mixed. It will need to be strained through a wire sieve before using. The mixture should be kept agitated in the barrel, and a nozzle used which by reversing can be easily cleaned. This mixture, with the addition of 15 pounds of salt per barrel, makes a good whitewash for buildings, which work can be easily done with a spray pump.

KEROSENE EMULSION FOR THE OYSTER-SHELL BARK LOUSE.

An experiment to gain information as to the value of kerosene emulsion for destroying the young lice when they have just hatched on apple trees was made in a neighbour's orchard. The work was done on young trees two years planted, which were all badly covered with the insect. Three experiments were made with this emulsion, and five trees were treated in each case.

The emulsion was made by dissolving one-half pound of hard soap in 1 gallon of rain water which was brought to the boiling point when 2 gallons of kerosene was added and churned briskly through a pump when it was quickly formed into an emulsion. Experiment No. 1 was with this emulsion diluted with water in the proportion of 1 part of the oil used to 4 parts of water (not 1 part of the emulsion to 4 parts of water). Experiment No. 2 contained 1 part of oil to 6 parts of water, and Experiment No. 3, 1 part of oil to 9 parts of water.

While this mixture proved fairly effective, yet in every case the trees were not entirely freed of the young insect. The spraying was thoroughly done, and it seems strange that some of the trees were completely cleared while some had quite a few still remaining. By giving two sprayings, one about a week after the other, this remedy has been found quite effective.

The spraying was done July 4, and notes taken later in the season. The emulsion was put on during a bright day, and no noticeable damage was done to the leaves or bark by the mixture. During a bright day the oil evaporates more quickly, and hence perhaps is not so liable to injure the tree.

TOBACCO WATER FOR THE OYSTER-SHELL BARK LOUSE.

An experiment with tobacco water was also tried on five trees in the same orchard. The solution was made by soaking 15 pounds of tobacco stems in a barrel of water 24 hours, and the liquid was used as a spray. The trees were badly covered with the insects just hatched. The spraying was done July 4. It was found that this was of little value, and the notes subsequently taken would indicate that not more than 10 per cent of the hatched insects were killed.

GARDEN PEASE.

Experiments were conducted with 84 varieties of garden pease. The object being to determine the relative value of the different kinds for early, medium and late market crops. The seed was sown on April 27 in two plots each, one row 66 feet long. The rows were 4 feet apart and the seed was planted 1½ inches deep and 2 inches apart. The marketable green pease with pods were pulled when fit for use, and the yield per plot obtained. The other plot was allowed to ripen, and the yield of ripened seed obtained.

The land on which these pease were grown was a clay loam, and was in potatoes the previous season. No barn-yard manure was used for the crop, but complete fertilizer at the rate of 100 pounds per acre was scattered along the rows before planting, and was worked in when covering the seed. The pea aphis did not trouble the crop this season.

Two new varieties were included in the test, namely, King Edward VII. and Prosperity. The former is an English variety and a large pea of excellent quality. It is a little earlier than American Wonder and Nott's Excelsior. Prosperity has a large pod and should prove a valuable market sort. The variety Gradus has not been a heavy cropper, but its quality is of the best. The varieties we would recommend, and which came in the order named for earliness are : Tom Thumb, Nott's Excelsior, American Wonder, Dwarf Telephone and Sutton's Dwarf Defiance, all dwarf varieties. Of half high sorts, Alaska, Ameer, Gradus, Carter's Up-to-Date, Duke of York, Profusion and Telegraph.

PEASE—TEST OF VARIETIES

Name of Variety.	Season of Green Peas.	Weight of Green Peas.	Height of Vine.	Length of Pod.	Size of Pea.	Yield of Ripe Seed.
		Lbs.	Inches.	Inches.		Lbs.
Gregory's Surprise	July 12 to 20	21	36	2¼ to 2¾	Medium	4¼
Station	" 12 to 20	24	30	2¼ to 2¾	"	5½
Alaska	" 12 to 20	30	30	2¼ to 2½	"	7
Extra Early	" 12 to 20	24	36	2¼ to 2¾	"	7
Thorburn's Extra Early	" 12 to 20	29	38	2¼ to 2¾	"	7
Simmers' First of All	" 12 to 20	20	30	2 to 2½	"	5¼
Cleveland's First and Best	" 13 to 22	22	36	2½ to 2¾	"	8
Tom Thumb	" 13 to 22	27	18	2¼ to 2¾	"	7¾
Extra Early Daniel O'Rourke	" 13 to 22	20	30	2 to 2½	"	5¼
Mills' First of All	" 13 to 22	23	30	2¼ to 2½	"	5
Rural New Yorker	" 13 to 22	20	30	2½ to 2¾	"	5
Early May Improved	" 13 to 22	27	38	2½ to 2¾	"	7
Ameer	" 13 to 22	32	35	2½ to 3	Large	4
Bergen Fleetwing	" 13 to 22	34	36	2¼ to 2¾	Medium	10½
Exonian	" 13 to 22	20	27	2¼ to 2½	"	6¼
Sunol	" 13 to 22	20	32	2¼ to 2½	"	6
Early Frame Improved	" 13 to 24	22	32	2¼ to 2½	"	6¾
Philadelphia	" 13 to 24	19½	36	2¼ to 2¾	"	6½
Premium Gem	" 15 to 24	34	24	2½ to 2¾	"	8
S. B. & M. Co.'s Extra Early	" 15 to 24	34	38	2¼ to 2¾	"	9¼
Gradus	" 15 to 24	16¾	25	3 to 3½	Large	6¾
King Edward VII	" 15 to 24	22½	32	3 to 3½	"	7
Prosperity	" 15 to 24	22	30	2½ to 3½	"	7
Chelsea	" 15 to 24	33½	23	2½ to 3	Medium	6¼
Extra Early Pioneer	" 15 to 24	16¾	30	2¼ to 2½	"	6¾
Nott's Excelsior	" 16 to 25	26	18	2¼ to 2¾	"	7
American Wonder	" 16 to 25	42	16	2¼ to 2½	"	8
Extra Early Kent	" 16 to 25	32	38	2¼ to 2¾	"	7
New Maud S	" 16 to 25	24	48	2¼ to 3	"	9¼
Early Dexter	" 16 to 25	34	36	2¼ to 2½	"	10½
Early Star	" 17 to 25	24	30	2 to 2½	"	5¾
Ringleader	" 17 to 25	22	38	2¼ to 2½	"	8¼
Hancock	" 17 to 25	22	40	2¼ to 2¾	"	9
Blue Beauty	" 17 to 26	22	24	2½ to 2¾	"	6½
Blue Peter	" 17 to 26	28	18	2¼ to 2½	"	8
Evergreen	" 18 to 26	22	32	2¼ to 2½	"	5½
Dwarf Wrinkled Sugar	" 18 to 26	25	24	2½ to 3	"	9¼
Kentish Invicta	" 20 to 29	27	42	2¼ to 2½	"	9
King of the Dwarfs	" 22 to 29	38	24	2¼ to 2½	"	9
Carter's Up to Date	" 22 to 29	39	46	3 to 3¾	Large	9
Alpha	" 22 to 29	25	41	2 to 2½	Medium	8
Admiral	" 24 to Aug. 1	39	38	2 to 2½	Small	12
Pride	" 24 " 1	33	43	2½ to 2¾	Large	10
French Canner	" 24 " 1	34	36	2½ to 3	Small	10½

PEASE—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Season of Green Peas.		Weight of Green Peas.	Height of Vine.	Length of Pod.	Size of Pea.	Yield of Ripe Seed.
			Lbs.	Inches.	Inches.		Lbs.
Boston Wrinkled	July 24	Aug. 1	31	34	2½ to 2¾	Medium	11½
McLean's Prolific	" 24	" 1	25	32	2¾ to 3½	"	7
Duke of York	" 24	" 1	30	36	3 to 3½	Large	8½
Anticipation	" 24	" 3	37	30	2½ to 3¼	"	9½
Dwarf Telephone	" 26	" 3	44	20	3 to 3½	"	7½
McLean's Gem	" 26	" 3	50	30	2½ to 2¾	Medium	10½
Eugenie	" 26	" 3	46	40	2½ to 3	"	10½
900 to 1	" 26	" 3	46	46	2¼ to 3¼	"	9½
Pride of the Market	" 26	" 3	44	31½	2½ to 2½	"	12½
Stanley	" 26	" 3	31	31	3¼ to 4	Large	9¼
Champion of England	" 26	" 3	35	43	2¾ to 3¼	"	10
Burpee's Profusion	" 26	" 3	43	40	2½ to 2¾	"	10½
Horsford's Market	" 26	" 3	37	36	2½ to 2¾	Medium	11
Sutton's Satisfaction	" 26	" 3	48	40	2¾ to 3	"	10¼
New Giant-Podded Marrowfat	" 26	" 3	48	32	3 to 3½	Large	13¼
Black-eyed Marrowfat	" 26	" 3	48	46	2½ to 3	"	14½
Laxton's Alpha	" 26	" 3	43	44	2 to 2½	Medium	10¾
Hair's Dwarf Mammoth	" 26	" 3	39	32	2½ to 3½	Large	10
Abundance	" 26	" 3	38	32	2¾ to 2¾	Medium	11½
Everbearing	" 26	" 3	38	42	2¾ to 3¼	Large	9¼
Schereizer's Giant	" 26	" 3	38	52	3 to 3¾	Medium	7¼
Prince of Wales	" 26	" 3	29	36	2½ to 3	Large	8¼
Startler	" 26	" 3	30	35	2½ to 3	"	11
Daisy	" 26	" 3	36	28	2½ to 3	"	10½
Sutton's Dwarf Defiance	" 26	" 3	46½	24	3 to 4	"	10¼
Melting Sugar or Edible-podded	" 26	" 5	35	53	2½ to 3	Medium	14
Profusion	" 26	" 5	44	30	2¼ to 2¾	"	9¼
Grant's Favourite	" 26	" 5	31	48	2¼ to 2½	"	10
Scimitar	" 26	" 5	50	48	3 to 3¾	Large	10½
Forty-fold	" 26	" 5	47	52	2 to 2½	Medium	12
Telegraph	" 26	" 5	46	43	2¾ to 3	Large	10
Heroine	" 27	" 5	36	34	3¼ to 4	"	9
Queen	" 28	" 5	48	34	3¼ to 4	"	11½
Juno	" 28	" 5	42	24	2½ to 2¾	Medium	10
New Victory	" 28	" 5	34	40	3¼ to 4	Large	10½
Sharp's Queen	" 29	" 5	24	36	3 to 3¾	"	8½
Duke of Albany	" 29	" 5	53	40	2½ to 3	"	14
Shropshire Hero	" 29	" 5	58	30	3 to 3¾	"	12
Veitch's Perfection	" 29	" 5	22	42	2¼ to 2¾	Medium	6
Sander's Marrow	" 29	" 5	26	40	2¼ to 2¾	"	11½

BEANS.

Thirty-two varieties of garden beans were grown to test their value for green beans and for ripening. These were planted in rows 3 feet apart, 2 rows of each 66 feet long. One plot was pulled when the string beans were fit for market, and the weights are given in the following table. The other plot was allowed to ripen its seed. The seed was planted June 3, in rows 1½ inches deep and 3 inches apart in the row.

The land was previously in pease, and received no stable manure this year. When the seed was sown complete fertilizer at the rate of 150 pounds per acre was scattered along the row and worked in when the seed was covered. The soil was a clay loam. The season was very favourable for this crop, and the bean pod spot was not so prevalent as it was last year.

Cylinder Ivory-podded Wax and Yosemite Wax are exceptionally fine golden podded varieties, but they are more liable to be attacked by the pod spot than some of the other golden sorts. The Extra Early Edible podded is a very fine extra early green pod variety. Pods of these three varieties will keep tender longer than any of the

other sorts tested. For general croppers the following are recommended:—Extra Early Edible podded, Early Long Yellow Six Weeks, Extra Early Red Valentine and Refugee, for green sorts, and Dwarf German Black Wax, Wardwell's Kidney Wax, Detroit Wax and Keeney's Rustless Wax for golden podded sorts. These come in the order named for market.

BEANS—Test of Varieties.

Name of Variety.	Dates when Pulled.			Total Yield per Plot.	Colour of Pod.	Quality for String Beans.	Length of Pod.	Proportion Rusted.	Yield of ripened seed.
	Aug. 1.	Aug. 9.	Aug. 20.						
	Lbs.	Lbs.	Lbs.	Lbs.			Inches.		Lbs.
Currie's Rust-proof Golden Wax.	35	14¼	9	58¼	Yellow.	Fair....	3¾ to 4½	Slight.....	9
Extra Early Edible Podded.....	29½	10	9	48½	Green..	Good...	3 " 4	Very slight	8
Flageolet Scarlet Wax.....	26	7¾	19	52¾	Yellow.	Fair....	4½ " 5½	" ..	9¾
Early Mohawk.....	26¼	11	18	55¼	Green..	"	4½ " 5½	" ..	8¾
Early Golden Wax.....	24	10	18¼	52¼	Yellow.	Good...	3½ " 4	Slight.....	10¼
Early Black Dwarf Wax.....	23	10¾	8	41¾	" ..	Fair....	3¾ " 4½	Badly.....	6
Wardwell's Dwarf Kidney Wax.	22¼	6½	12	40¾	" ..	"	4 " 5	"	7½
Cylinder Ivory Podded Wax....	22	10	18½	50½	" ..	Good...	3½ " 4½	"	8¼
Rust-proof Golden Wax.....	22	8¾	15	45¾	" ..	" ...	3½ " 4½	Slight.....	6¾
Early Long Yellow Six Weeks..	22½	5¼	16	43½	Green..	Fair...	4½ " 5½	"	10¼
Emperor of Russia.....	16½	8½	12	36¾	" ..	"	4¼ " 5	None.. ..	6
Black Eyed Wax.....	14	14½	10¾	39	Yellow.	Good...	3¾ " 4¾	Very slight	6
New Golden Eyed Wax.....	14	8½	8	30½	" ..	Poor...	3½ " 4½	Badly.....	6½
Yosemite Wax.....	12¼	14¼	15	41½	" .	Good...	4½ " 5½	Slight.....	5¾
Dun Colour	12	11½	6	29½	Green..	Poor...	4½ " 5¼	"	7¼
California Pea.....	10¼	14	18¾	43	" .	Fair....	3½ " 4	None.....	8¾
Speckled Wax.....	6¼	13½	24	43¾	Yellow.	"	4½ " 5½	Slight.....	9
Fame of Vitry.....	.....	30¼	25	55¼	Green..	"	6 " 6¾	None.....	9¾
Early China.....	....	28¾	4	32¾	" ..	"	4 " 5¾	Very slight	8
New Triumph.....	.....	28½	18	46½	" ..	Poor...	4½ " 5	None.....	10
New Stringless.....	.....	27	6¾	33¾	" ..	Good...	4 " 4¾	Slight.....	10
Extra Early Red Valentine.....	....	26	22¼	48¼	" ..	Fair....	3¾ " 4½	Very slight	10¼
Early Large White Marrowfat..	.....	24¼	12	36¼	" ..	"	3¼ " 4	" ..	10
Royal Dwarf Kidney.....	.....	22	23½	45½	" ..	"	5 " 6½	" ..	10½
Keeney's Rustless Wax.....	.....	22¼	15	37¼	Yellow.	Good...	3¼ " 3¾	None.....	6¾
Faber's I. X. L.....	....	22¼	14	36¼	Green..	Fair....	4½ " 5	Very slight	9¼
Canadian Wonder.....	.....	16¼	28	44¼	" ..	"	4½ " 5½	None.....	11¼
Black Speckled Wax.....	.....	16	28¼	44¼	" ..	"	5½ " 6	"	8
Detroit Wax.....	.....	16	14¼	30¼	Yellow.	"	3½ " 4¼	Slight.....	8
Rogers Lima Wax.....	.....	8¾	45	53¾	" ..	"	3½ " 4	None.....	9
Early White Seeded	.....	8½	32½	41	Green..	"	3 " 3¼	Very slight	7½
Refugee.....	.....	.....	36¼	36¼	" ..	" ...	4½ " 5	None.....	5

BEANS FERTILIZED AND NOT FERTILIZED.

To gain information as to the value of an application of complete fertilizer to hasten the bean crop for early market, three varieties of beans were sown in duplicate rows, one row of which was fertilized at the rate of 200 pounds per acre scattered along the row covering a space of 6 inches wide which was raked in before seeding. The other row received no fertilizer. Drills were made 1½ inches deep, and the seed placed 2 inches apart and covered. The seed was sown June 3. The land was similar to that on which the other beans were grown. The weights as given below were obtained in each case from 1 row 66 feet long. There were also duplicate plots which were allowed to ripen their seed. There is apparently a marked difference in favour of using fertilizer to hasten the crop for early market.

Name of Variety.	Fertilized.	When Pulled and Yield.			Total Yield from Plot.	Ripe seed per Plot.
		Aug. 3.	Aug. 9.	Aug. 20.		
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Dwarf German Black Wax	Yes.	22¼	2	2¼	26½	6¼
" "	No.	12	5½	2	19½	5¾
Detroit Wax	Yes.	14¼	16¼	11¾	42¼	9½
"	No.	2	24½	10½	35	6¾
Long Yellow Six Weeks	Yes.	20	21¾	6	47¾	8¾
" "	No.	4¼	20½	2	26¾	7¾

ONIONS.

Eighteen varieties of onions were sown in a hot-bed March 25, in rows 3 inches apart and three-quarters of an inch deep. The seed was scattered so that from 10 to 12 seeds occupied an inch of row. These made good growth, with the exception of Prizetaker, which variety failed to germinate. The plants were transplanted to the open ground May 11. At this time they were about one-half the size of a lead pencil.

The land had previously been in garden crops, and was in a fairly good state of fertility. It was manured in the fall of 1900 with 20 tons of stable manure per acre, which was ploughed under. This was worked up in the spring and the land run into rows 30 inches apart. These rows were raked off and fertilized at the rate of 400 pounds per acre with complete fertilizer, which was raked in on top of the levelled rows. Two rows of onions were set to each marked row, placed 6 inches apart, and the plants were set 3 inches apart in the rows. The soil was a clay loam.

The distance generally advised for onions is in rows 12 inches apart on level ground, and 3 inches apart in the rows. The plants were set three-quarters of an inch deep in the ground. If the soil is light they would do better if planted still deeper.

If the onion seed is to be started in the open ground the land should be worked up as early in the spring as possible. The earlier the seed is in the better. If grown in this way the Bartletta and Extra Early Flat Red have been the best sorts tested here for that method of culture. Few varieties of onions have done well here from seed sown in the open ground. The season is too short and they do not mature properly. The transplanting takes very little more time than thinning the plants which is necessary when the seed is sown in the field. No plant is more easily transplanted than the onion, and the plants can be set any time after the first of May.

The onion grows best on a soil previously well enriched, and having an abundant amount of available plant food. The manure if applied in the spring should be well rotted and thoroughly worked into the surface soil. The best practice is to manure in the fall and continue growing this crop on the same ground for several years.

The first four named sorts in the list which follows are early white varieties. The Mammoth Silver King is a very large growing white onion, maturing early. The Prizetaker has previously been tested, and ranks as one of the best for transplanting and for general crop. The Yellow Globe is also a splendid sort for this purpose. Onions should be gathered as soon as the crop is matured, or when the most of the necks have withered and turned yellow. The white onions if not pulled and stored when matured are liable to turn green, which lessens their value very much.

The onions should first be allowed to dry for a week or ten days in piles in the field. If the weather is not favourable, as is often the case here, they should be spread on the floor of an outbuilding until thoroughly cured. They keep best in a dry, cool cellar with the temperature just above the freezing point. They should be cured with the

tops on, and will keep well in this condition, and topping can be done when they are prepared for the market.

The yield of the different varieties as given below is from one row 33 feet long. The varieties are given in the order of their earliness.

ONIONS—TEST OF VARIETIES.

Name of Variety.	Date when Pulled.	Yield of Row 33 ft. long.
		Lbs.
Paris Silverskin	Sept. 2....	33½
Barletta	" 2....	29½
New Queen	" 2....	24½
White Dutch	" 2...	30½
Extra Early Flat Red	" 11....	18¼
Wethersfield Large Red	" 11....	20¾
Southport White Globe	" 11....	14¼
Mammoth Silver King	" 11....	38½
Australian Brown	" 11....	29¼
Blood Red	" 11....	32½
Straw-coloured Spanish	" 11....	34½
Market Favourite Keeping	" 11....	26½
Southport Yellow Globe	" 11 ...	40
James' Keeping	" 11....	23
Trebon's Large Yellow	" 11...	29
Golden Globe	" 11....	17¼
Danver's Yellow Globe	11....	25½

CABBAGE.

Twenty-three varieties of cabbage were grown in the test plots. The object of the experiment was to obtain information as to the value of the different sorts for early market purposes. The seed was sown in a hot-bed April 13, in rows 4 inches apart. The plants were thinned to one inch apart in the rows on April 25, and were set in the open ground May 15. The glass should remain off the hot-beds for 10 days before putting the plants out to harden them up. The plants should be given plenty of room in the hot-bed and not too much water.

The soil in which the plants were set was a heavy clay loam, which was manured in the fall of 1900 with stable manure at the rate of 20 tons per acre. This was ploughed under, and the following spring was worked up and run into rows 30 inches apart. The rows were raked off and the plants put out. On May 30, a tablespoonful of nitrate of soda was scattered on the soil around each plant, covering a space of about 5 inches in diameter. Nitrate of soda supplies nitrogen in a readily available form, giving the plants a vigorous start. They made good growth at the beginning, but owing to the exceptionally dry weather they did not produce large heads.

The cabbage root maggot did not give any trouble this season, and seems to have entirely disappeared. The cabbage worm *Pieris rapae* is increasing, and is found to be a very troublesome pest.

Twenty plants of each variety were set in rows 30 inches apart, and 24 inches apart in the rows. The yield has been calculated from the produce of one row 33 feet long, there being 16 plants in this area. These were cut and weighed August 18 and 29. The following table gives the varieties in the order of their earliness. Heads of some of the varieties were fit for market before the 18th, and many of the later sorts were not fully developed.

It was found that Flat Parisian, very early; Express and Early Spring, early; and Vandergaw, later, were the best of all the sorts tested.

CABBAGE—TEST OF VARIETIES.

Name of Variety.	Aug. 18.		Aug. 29.		Total Number of heads pulled.	Total Weight of heads.
	Number of heads pulled.	Weight of heads.	Number of heads pulled.	Weight of heads.		
		Lbs.		Lbs.		Lbs.
St. John's Day	12	21¼	4	7¾	16	29
Paris Market	8	19½	8	23¼	16	42¾
Flat Parisian	12	31¼	4	11	16	42¼
Jersey Wakefield	10	29½	6	18½	16	48
Express	11	23½	5	13¼	16	47
Early Spring	11	25½	5	10½	16	46
Etampes	9	25¼	7	17¾	16	43
Earliest of All	9	21	7	16¾	16	37¾
Imp. Early Summer	8	24½	8	22	16	46½
Early Summer	7	17½	9	19½	16	37
Early Flat Dutch	7	21	9	27½	16	48½
Earliest White Giant	7	19½	9	26	16	45½
Winningstadt	7	15¾	9	23½	16	39¼
Vandergaw	7	18½	9	23½	16	42
Burpee's All Head	6	17	10	29½	16	46½
All Seasons	4	12	12	33½	16	45½
Succession	4	9¾	12	27½	16	36½
Dwarf Savoy	4	10½	12	23	16	33½
Green Globe Savoy	3	7	13	25	16	32
Fottler's Brunswick	2	7	14	44½	16	51½
Surehead Improved	2	6	14	40½	16	46½
Premium Flat Dutch	2	6½	14	43	16	49½
Marblehead Mammoth	2	6¼	14	39½	16	45¾

CAULIFLOWER.

Eight varieties of cauliflower were tested on land similar to and receiving the same preparation as that on which the cabbages were grown. The seed was sown in the hot-bed April 9, and transplanted to another hot-bed April 25 in rows 3 inches apart, and 2 inches apart in the rows. They were planted in the open ground May 15, in rows 30 inches apart, and 20 inches apart in the rows. The yield given in the following table was from one row 33 feet long, there being 20 plants in that length of row. Twenty-five plants were set of each variety.

The first heads of the early varieties were very good, especially the Early Snowball and Extra Early Whitehead, but the season becoming very dry the remainder of the heads were not well formed. The Nonpareil, formerly tested here, and considered a good sort was poor this season, forming but few good compact heads. This was probably due to the dry weather. The Half Early Paris was very poor. The Large Late Algiers gave some good heads later in the season.

The cauliflower plant requires a good, deep, rich loam, retentive of moisture, as the heads do not fill out well and compact unless well supplied with water.

The root maggot did not trouble any of the plants. Nitrate of soda applied at the same time and in similar manner to that used on the cabbages proved valuable in giving a quick vigorous early growth to the cauliflowers.

Name of Variety.	Cut July 20.		Cut July 26.		Cut Aug. 5.		Total Yield.		Character of Head.
	Number of Heads.	Weight of Heads.	Number of Heads.	Weight of Heads.	Number of Heads.	Weight of Heads.	Number of Heads.	Weight of Heads.	
		Lbs.		Lbs.		Lbs.		Lbs.	
Early Snowball	8	14	10	20	2	3¼	20	37¼	Good.
Gilt Edge	10	14½	6	7¼	4	3	20	24½	Fair.
Extra Early Selected Erfurt	9	10½	7	9⅛	4	3¼	20	23¼	"
" Whitehead	8	15½	8	11⅝	4	5¼	20	32½	Good.
" Paris or Nonpariel	5	7½	6	7¼	9	9¾	20	24½	Fair.
Half Early Paris	.....	.....	.....	.....	13	13⅝	13	13⅝	Poor.
Chambourcy's Mammoth	.....	.....	.....	.....	15	22⅝	15	22⅝	Very poor.
Late Algiers	.....	.....	.....	.....	2	2¼	2	2¼	Good later.

TOMATOES.

Experiments were conducted this season with 48 varieties of tomatoes. The seed was sown in a hot-bed March 25, in rows 3 inches apart. The plants were thinned to one inch apart in the rows when quite small, and on April 16 were set, one plant to a strawberry box filled with soil. These boxes were put close together into another hot-bed on about 1 inch of soil and remained there until put out in open ground on June 8.

The tomato plant likes plenty of heat, and growth is vigorous if proper conditions are given. The plants, however, should have sufficient ventilation to make them stocky and thrifty, and after the middle of May the glass should be left off the hot-bed as much as possible. When grown in strawberry boxes the earth soon dries out, making frequent watering necessary. The plants were put in the open ground in rows, 4 feet apart each way. The boxes in which the plants were grown were taken to the field and cut so that the plants with the earth attached could be taken out and placed in position without checking growth.

The land on which these plants were put was previously in millet, and received no barn-yard manure for the tomato crop. After the plants were out a week a handful of nitrate of soda was scattered around each plant just before a rain. This proved very beneficial and gave a vigorous early growth not obtained in any other way.

The varieties of rough and irregular growth are not as suitable for market as the smoother sorts, and some of the earliest ripening varieties are of this character. Some, however, of the smooth sorts ripen the bulk of their crop about as early as many of the wrinkled ones. Of the wrinkled sorts the earliest of all, Early Richmond and Early Conqueror are recommended. The last named sort is developing into a much smoother fruit than formerly, and splendid market specimens were obtained from some plants of this variety. The varieties recommended for market and general use are Early Ruby, Atlantic Prize, Fordhook's First, Dwarf Champion, and New Stone.

The quantity of fruit obtained from four plants of each variety is given in the following table. The balance of the fruit not ripened was picked September 10.

TOMATOES—EXPERIMENTS WITH VARIETIES.

Name of Variety.	Date of Early Pickings, and Yield of Ripe Fruit.						Total Yield from 4 plants of Ripe Fruit.		Total Yield from 4 plants of Green Fruit.		Total Yield from 4 plants.		Size and Character of Fruit.
	Aug. 19.		Aug. 27.		Aug. 31.								
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Earliest of All	3	4	5	15	6	4	26	7	14	2	40	9	Small rough.
Early Conqueror	1	15	8	9	14	..	32	8	16	..	48	8	Medium smooth.
Acme	1	8	3	4	5	1	14	9	22	..	36	9	"
Livingston's Perfection	1	7	4	9	6	7	24	..	16	..	40	..	Large smooth.
Early Ruby	1	4	16	6	10	8	41	14	14	2	56	..	Medium smooth.
Brinton's Best	..	11	2	8	7	9	21	10	30	..	51	10	"
Matchless	..	11	3	14	4	..	19	13	12	..	31	13	Large smooth.
Early Bermuda	..	10	3	8	3	12	13	8	18	..	31	8	Large rough.
Mikado	..	9	2	4	4	12	13	9	22	..	35	9	Medium smooth.
Improved Trophy	..	9	1	2	4	12	15	7	45	8	60	15	"
Mitchell's No. 1	..	8	1	8	3	2	9	10	35	..	44	10	Large rough.
Money Maker	..	7	4	3	7	10	23	4	49	..	72	4	Large smooth.
Early Richmond	..	6	5	2	6	9	28	9	16	9	45	2	Large rough.
Beauty	..	5	1	10	4	9	14	..	31	..	45	..	Medium smooth.
Early Bird	..	4	3	5	7	11	31	4	20	10	51	14	"
Potato Leaf	..	4	4	8	3	10	15	6	20	..	35	6	Large smooth.
New Stone	..	2	..	8	3	..	10	10	28	..	38	10	"
Favourite	..	2	1	11	2	2	9	..	32	..	41	..	"
Mayflower	..	..	6	4	4	14	20	2	16	..	36	2	Medium smooth.
Ponderosa	..	..	4	12	2	4	13	..	50	..	63	..	Very large rough.
Ignotum	..	..	4	12	5	4	18	8	45	..	63	8	Large smooth.
Crimson Cushion	..	..	4	7	5	2	10	7	24	..	34	7	Large rough.
Atlantic Prize	..	..	4	6	6	2	21	8	35	..	56	8	Medium smooth.
Canada Victor	..	..	4	6	5	1	18	6	27	..	45	6	"
Royal Red	..	..	4	4	4	1	18	7	37	..	55	7	Large smooth.
Volunteer	..	..	4	..	4	8	14	8	37	8	52	..	"
Comrade	..	..	3	12	3	2	17	6	32	..	49	..	Medium smooth.
Lorillard	..	..	3	5	8	..	18	..	40	..	58	1	"
New Enormous	..	..	3	4	4	9	23	3	42	..	65	3	Large rough.
Democrat	..	..	3	..	4	7	12	7	45	9	58	..	Medium rough.
Aristocrat	..	..	2	8	4	12	12	12	43	7	56	3	Medium smooth.
New Everbearing	..	..	2	8	3	9	9	9	31	6	40	15	"
Potomac	..	..	2	6	4	12	20	8	37	8	58	..	"
Bond's Early Minnesota	..	..	2	4	4	6	17	10	41	..	58	10	"
Conference	..	..	2	4	9	6	20	10	20	..	40	10	"
Greekside Glory	..	..	2	3	7	10	18	1	33	..	51	1	Large rough.
Baltimore Prize Taker	..	..	2	2	6	12	14	14	37	2	52	..	Medium smooth.
Maule's New Imperial	..	..	2	1	2	9	22	2	38	..	60	2	Large smooth.
Imperial	..	..	2	..	8	..	26	..	40	6	66	6	"
Fordhook's First	..	..	2	..	8	12	16	12	28	..	44	12	"
Buckeye State	..	..	1	13	3	4	18	..	40	..	58	..	"
Waldorff	..	..	1	12	3	8	14	4	18	..	32	4	Small smooth.
Large Red Perfection	..	..	1	8	1	14	9	6	34	..	43	6	Large rough.
Thorburn's Long Keeper	..	..	1	..	1	10	9	10	28	..	37	10	Large smooth.
Honor Bright	..	..	..	12	1	10	18	2	32	..	50	2	"
Golden Queen	..	..	..	10	3	14	14	..	37	10	51	10	"
Table Queen	..	..	..	10	5	8	13	2	25	..	38	2	"
Fordhook's Fancy	..	..	..	..	3	1	11	2	21	..	32	2	Small smooth.

CORN.

Twenty varieties of garden corn were tested. The seed was sown June 5, on the level, in rows 3 feet apart, and the plants were thinned to 10 inches apart in the rows. The land was in garden pease the previous season, and was of a sandy loam character. It was ploughed in the spring and worked up. No barn-yard manure was used, but complete fertilizer at the rate of 500 pounds per acre was sown broadcast and harrowed in with the smoothing harrow. The horse cultivator was run through the rows at intervals of 10 days during the summer.

The season was very suitable for the corn plant. The continuous warm weather matured the crop early, and varieties that have never before eared sufficiently for market produced a fine crop. The yield was calculated in each case from the product of one row 33 feet long. The following table gives the date of pulling, number of ears and weight of crop. The variety, Peep-O'Day, was the earliest variety grown. The best varieties as to quality were Crosby's Early, Early Marblehead and Early Minnesota. The Metropolitan, New Champion and Nonesuch are excellent sorts for main croppers.

EXPERIMENTS WITH CORN.

Name of Variety.	When Pulled.	Number of Ears.	Weight of Ears.	Length of Ears.
			Lbs.	Inches.
Peep O'Day	Aug. 29..	50	23	5½ to 6
Ford's Early Sugar	" 29..	56	25	5½ " 6½
First of All	" 29..	50	27	6 " 7
Red Cory	Sept. 2..	40	20½	6½ " 7
White Cory	" 2..	42	28	6½ " 7
Adams' Extra Early	" 2.	46	24	6 " 6½
Early Marblehead	" 2..	40	23	6½ " 7½
Crosby's Early	" 12..	42	17½	6 " 6½
Mammoth White Cory	" 12..	40	18¼	5½ " 6
Early Minnesota	" 12..	52	28	6 " 7
Metropolitan	" 12..	40	33	6½ " 7½
New Champion	" 12..	46	37	7 " 8
Nonesuch	" 15..	40	34	6¾ " 7½
Earliest Sheffield	" 15..	44	26	6 " 6½
Old Colony	" 17..	40	34	6½ " 7½
Moore's Early Concord	" 17..	40	29	6½ " 7
Perry's Hybrid	" 19..	48	36	6 " 7
Hickox Improved	" 19..	40	36	6½ " 7
Canada Yellow	" 19..	42	19	6 " 7½
Early Giant	" 22..	48	40	6 " 6½

CORN WITH SUCKERS REMOVED AND NOT REMOVED

Three varieties of corn sown at the same time, fertilized in the same manner, and given similar cultivation to that of the other corn plots, were grown to test the result of removing suckers from the corn plant in hastening maturity. The suckers were removed from one row of 33 feet July 20, and one row was left without being removed. No advantage was apparently gained by removing the suckers. The crop was pulled August 27, and the yield obtained was as follows:—

Name of Variety.	Suckered.		Not Suckered.	
	Number of Ears.	Weight of Ears.	Number of Ears.	Weight of Ears.
		Lbs.		Lbs.
Peep O'Day	38	14	34	13
Red Cory	24	11	34	18
First of All	24	12	30	17

PARSNIPS.

Six varieties of parsnips were sown May 16, in rows 30 inches apart. The land was previously in potatoes, and was a heavy clay loam. Barn-yard manure at the rate of 20 tons per acre was spread and ploughed under in the fall of 1900. The land was ploughed and worked up in the spring of 1901, and the rows run. The yields given are from 1 row 66 feet long. The Early Round is a short parsnip of good quality for early use. The Guernsey is a half long sort, which is very desirable. The Hollow Crown is probably the best for general crop, and is of excellent quality.

Name of Variety.	Yield from Plot.	Character of Root.
	Lbs.	
Guernsey	89½	Medium long.
Cooper's Market	88¼	"
Hollow Crown	72½	Long.
Elcombe's Giant	72½	"
Student	69½	Medium long.
Dobbie's Selected	65	"
Early Round	52	Short.

BEETS.

The land on which the beets were grown was of similar character, and the preparation the same as that on which the parsnips were grown. The yields given below were obtained in each case from one row 66 feet long.

Name of Variety	First fit to use.	Yield of Plot.	Remarks.
		Lbs.	
Extra Early Dark Red Flat	July 22..	93	Small, short.
Extra Early Blood Red Turnip	" 25..	108	Medium, short.
Nutting's Dwarf Improved	Aug. 15..	98	Medium, half long.
Dell's Blood Leaf	" 15..	78	Small, half long.
Long Smooth Blood	" 15..	134	Large, long.

WATER MELONS.

Four varieties of water melons were started in a hot-bed by planting seeds May 4, in strawberry boxes filled with loam. One foot of horse manure was used in this hot-bed and a moderate bottom heat obtained. It is not necessary to have much heat at this time of year for if forced the plants tend to have a weak and slender growth.

The bed was kept well ventilated, and the plants were gradually hardened off by removing the glass entirely 10 days before setting them out. They were removed to the open ground June 10. Two plants were allowed to a box, and two boxes were set to a hill, and the hills were made 5 feet apart each way. The boxes were cut and the ball of earth removed with the plants so that no check was given to their growth.

The hills were fertilized with complete fertilizers. The soil was a light loam and was previously in millet, and no manure was used after that crop was removed.

Specimens from all of the varieties ripened. The crop was not heavy and the melons did not grow large, but were of excellent quality. The varieties Peerless, Stoke's Early, Cole's Early, and Vick's Early were grown. For earliness they come in the order named. The Peerless was the finest of the sorts tested.

CUCUMBERS, SQUASH AND PUMPKINS.

Thirty-two varieties of cucumbers. Twenty-four varieties of squash and five varieties of pumpkins were grown on land of similar character to that on which the water melons were grown. Owing to the dry weather the crop was small, but the quality of the squash was above the average.

The White Spine and Boston Pickling cucumbers were the best varieties for general market and pickling purposes. The Bay State and Early Marblehead are two squashes worthy of special mention. The quality of these was exceptionally fine, especially the Bay State. The Hubbard and Essex Hybrid were the two best winter sorts tested.

SPINACH.

Several varieties of spinach were tested. The ground was prepared in a similar manner to that on which the parsnips were grown. The seed was sown in rows 28 inches apart on May 16. The Victoria was the best of the sorts tested, and was fit to use June 22. This plant makes excellent 'greens,' and is of the easiest culture.

EXPERIMENTS WITH EARLY POTATOES.

Eight varieties of early potatoes were planted to test their relative earliness when fertilized in different ways. One-half of a plot of ground was manured in the spring with 20 tons of stable manure per acre. The other half had no manure. The land was ploughed and worked up, and run into rows 28 inches apart. Two rows of a variety were planted through this strip thus making one-half of them manured and one-half not manured. Every other row was fertilized at the rate of 500 pounds of potato fertilizer per acre, which was scattered along the rows and covered with the potatoes. The land was a heavy clay loam, and suffered greatly from the dry season, the crop being very poor.

The first digging was made August 19, to find out what varieties would give the best results at that date. Strips 33 feet long were dug across each set of plots, and the potatoes gathered from each row. The yield given in the following table is from 1 row 33 feet long:—

Name of Variety.	Dug August 19.							
	Not Manured.				Manured.			
	Fertilized.		Not Fertilized.		Fertilized.		Not Fertilized.	
	Marketable.	Not Marketable.	Marketable.	Not Marketable.	Marketable.	Not Marketable.	Marketable.	Not Marketable.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Irish Cobbler	25½	6½	18½	4	24	6	19	3½
Burpee's Ex. Early	22½	3½	24½	3	18½	5½	15	4
Bovee	20	6	12	8½	19	6	10½	5½
Early Sunrise	17	8½	9	6½	20¾	5½	14	5½
Crown Jewel	22½	7	9	5	24½	4	14½	3
Early Gem	12	8	9	5½	17	7½	14	6½
Pearce's Ex. Early	11	6	10	5	21	4	14½	5½
Early Ohio	12	6	9	6½	16½	7	11	4½

Name of Variety.	Dug October 4.							
	Not Manured.				Manured.			
	Fertilized.		Not Fertilized.		Fertilized.		Not Fertilized.	
	Marketable.	Not Marketable.	Marketable.	Not Marketable.	Marketable.	Not Marketable.	Marketable.	Not Marketable.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Irish Cobbler	34	6	15	6	21	6	19	6
Burpee's Ex. Early	19	9	16	8	27	8	12	4
Bovee	22	8½	9½	4½	25	7	18	6
Early Sunrise	16	7½	12	5	19½	6	14½	6½
Crown Jewel	26	7½	10	6	24½	8	21½	8½
Early Gem	16	6	7½	6	19	11½	14	11½
Pearce's Ex. Early	17	9	12	7	17	9½	16½	10
Early Ohio	16	9	10	8	22½	8	14	10½

MEETINGS ATTENDED.

I attended the annual meeting of the Nova Scotia Fruit Growers' Association at Wolfville, N.S., January 28 and 29. I also addressed agricultural meetings at the following places:—

January 15.—Collingwood, N.S.
" 16.—Wallace Bridge, N.S.
" 17.—Upper Malagash, N.S.
" 18.—Tatamagouche, N.S.
" 19.—River John, N.S.
" 21.—Earltown, N.S.
" 22.—Central New Annan, N.
" 23.—Wentworth, N.S.
January 24.—Great Village, N.S.
" 25.—Bass River, N.S.
" 30.—Bridgetown, N.S.
March 1.—Kingston, N.B.
" 4.—Berwick, N.B.
" 5.—Jeffrey's Corner, N.B.
June 19.—East Amherst, N.S.

I have the honour to be, sir,
Your obedient servant,

W. S. BLAIR,
Horticulturist.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

BRANDON, MAN., November 30, 1901.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my fourteenth annual report, with details of experiments undertaken and work accomplished on the Brandon Experimental Farm during the past year.

The past winter was unusually mild. Snow fell early and the ground was completely covered until spring, but owing to the absence of severe wind storms there were very few drifts.

Spring opened about the average date, the first seeding being done at the Experimental Farm on the 8th of April, but on the 15th of April there was a heavy snow storm which delayed seeding for a week. After this date the weather was favourable and seeding was finished by May 16.

During the latter part of May the weather was unusually hot and dry, so much so that in a few instances young plants were completely killed.

On June 6, there was a heavy fall of wet snow. The growing grain was completely covered, while trees and shrubs were bent to the ground and in many instances severely injured.

On the night of the 7th of June, there were six degrees of frost, which severely injured both wild and cultivated fruits.

The rainfall in June was above the average and the growth of grain rank, but very soft and favourable to the spread of rust.

July was quite favourable for the growing crop, and August was dry and free of frost.

September and the early part of October were very showery and unfavourable for stacking and threshing, and much of the wheat became badly bleached, but the yield of all kinds of grain was largely above the average in nearly every part of the province, and the country has produced much the largest crop of grain in its history.

EXPERIMENTS WITH SPRING WHEAT.

Perhaps the most important feature, this year, in connection with this, our most valuable grain, is the remarkably uniform excellence of the crop throughout the province. In no portion of the country has the crop been a failure, and in nearly all parts the yield has been above the average. In addition to this the area sown is larger than usual, these two features combining to make it the largest crop of wheat grown in the country.

Owing to the rank growth of straw and the unfavourable weather, the crop was unusually expensive to harvest and thresh, and it is feared that a considerable portion of it, in some districts, will remain in the stack all winter.

On the Experimental Farm the yield of wheat was gen rally above the average, the only exceptions being the varieties particularly subject to rust, some of these gave a very poor yield of shrivelled grain.

Among the varieties tested this year, for the first time, are a number from Australia. These were, with one exception, badly rusted and the yield was small. Australian No. 13 had good clean straw and was quite productive, but the kernel was small and light. The heads of all the Australian varieties were large, and it is possible that they may compare more favourably in a dry year.

Four interesting varieties were received from the Minnesota Experiment Station. These had long but open heads and none of them equalled the Red Fife in productiveness.

The Goose wheat is again near the head of the list. It was the only variety perfectly free of rust, the straw remaining clean and bright all through the wet harvest weather. The grain is very flinty and not marketable here.

Four of the cross-bred varieties, originated at the Experimental Farms, have this year surpassed the Red Fife for productiveness. One of these, 'Crown,' is also second on the list of the best twelve varieties for the past five years.

There was a remarkable absence of smut in the wheat this year. This is particularly fortunate for had it been otherwise, the wet harvest and threshing season would have very thoroughly distributed the spores, greatly injuring the sample.

Owing to the unfavourable weather during the latter part of the season, most of the grain will grade No. 1 and No. 2 Northern.

About half an acre each of fall wheat and rye were sown during the month of August last. The plants became firmly rooted and were from four to six inches high when winter set in.

Seventy-two varieties of spring wheat were tested this year. They were all sown on the second and third of May, on a sandy loam soil, in plots of one-twentieth of an acre each.

WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs	Bush.	Lbs.	Lbs	
Speltz	Aug.	18	108	42 Very weak..	2½	Bearded..	4,600	45	20	39½	Slightly.
Goose	"	23	112	46 Stiff..		" ..	4,820	42	..	62	None.
Crown	"	17	106	48 Fair.	3½	" ..	5,020	38	..	59½	Slightly.
Admiral	"	19	108	50 Stiff.	3½	Beardless.	4,700	37	20	59½	Badly.
Progress	"	17	106	50 "	3½	" ..	3,180	37	..	60	"
Clyde	"	13	102	48 Fair.	3½	" ..	4,540	36	40	59½	"
Red Fife	"	22	111	51 Stiff.	3	" ..	5,140	36	40	60	Slightly.
Monarch	"	20	109	48 "	3	" ..	5,220	36	20	59½	"
White Russian	"	22	111	46 "	3	" ..	5,880	36	..	58½	"
Stanley	"	17	106	51 "	3	" ..	5,080	36	..	59½	"
Australian No. 13	"	22	111	46 "	3	" ..	6,120	36	..	58½	"
Vernon	"	20	110	44 Weak	2½	Bearded..	6,360	35	40	59	"
Roumanian	"	22	112	50 "	3	" ..	4,700	35	40	62	"
Beauty	"	20	109	47 Fair..	3	Beardless.	5,300	35	40	58½	"
Huron	"	18	107	46 Stiff.	3	Bearded..	4,720	35	20	59	Badly.
Alpha	"	14	103	45 "	3	Beardless.	5,640	35	..	59	"
Laurel	"	22	111	46 "	3½	" ..	6,040	35	..	56	Slightly.
Norval	"	11	101	45 Fair.	2½	Bearded..	5,320	34	40	59½	"
Wellman's Fife	"	20	109	48 Stiff.	3	Beardless.	5,060	34	40	59½	Badly.
White Fife	"	20	109	42 "	3½	" ..	5,380	34	20	60	"
Advance	"	14	103	48 Fair.	3	" ..	5,180	34	20	59	Slightly.
Minnesota No. 163	"	22	111	44 Stiff.	3	" ..	6,100	34	..	59	Badly.
White Connell	"	22	111	46 "	3	" ..	5,400	34	..	59½	Slightly.
Minnesota No. 149	"	22	112	46 "	3½	" ..	5,620	33	40	59½	Badly.

WHEAT—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs	
Dawn	" 12	101	41	Fair	3	" ..	4,440	33	20	59½	Badly.
Benton	" 14	103	39	"	2½	" ..	4,080	33	20	58½	"
Rio Grande	" 17	107	53	Stiff	3½	Bearded..	6,220	33	..	60	"
Campbell's White Chaff	" 19	108	47	"	3	Beardless.	3,640	33	..	59	"
Rideau	" 16	105	45	"	2½	" ..	3,760	33	..	59	Slightly.
Minnesota No. 169	" 20	111	49	Fair	3½	" ..	6,240	32	40	59	"
Blenheim	" 17	106	49	Stiff	3	Bearded..	5,460	32	20	58	"
Blue Stem	" 25	114	51	Fair	3½	Beardless.	4,900	31	40	57½	Badly.
Weldon	" 22	111	44	Stiff	3	" ..	5,840	31	40	59	"
Colorado	" 17	106	50	Fair	3½	Bearded..	6,420	31	20	59	Slightly.
Plumper	" 20	110	44	Stiff	2½	" ..	4,120	31	20	60	"
Mason	" 16	105	43	"	3	Beardless.	3,680	31	..	61	Badly.
Preston	" 17	106	50	"	3	Bearded..	4,940	31	..	58½	"
Byron	" 17	107	49	"	3	" ..	4,160	30	40	58½	"
Angus	" 16	106	48	"	4	Beardless.	5,040	30	40	48	Consid'rably
Dufferin	" 14	103	45	Fair	3	Bearded..	3,860	30	40	59	Slightly.
Blair	" 22	112	47	Weak	3	Beardless.	5,920	30	20	59½	"
Australian No. 9	" 20	109	46	Fair	3	" ..	5,680	30	..	58	Badly.
Hungarian	" 20	109	42	"	2½	Bearded .	4,660	29	40	59½	Slightly.
Pringle's Champlain	" 16	106	40	"	3	" ..	6,340	29	20	58	"
Percy	" 10	99	50	Stiff	3	Beardless.	4,180	29	20	60	Badly.
Cartier	" 13	102	38	Fair	3	Bearded..	4,800	28	..	58½	"
Ebert	" 12	102	43	Stiff	3	Beardless.	3,820	28	..	59½	"
Crawford	" 15	105	46	Fair	3	" ..	5,060	28	..	58½	"
Red Fern	" 20	110	48	"	3	Bearded..	5,220	28	..	60	"
Fraser	" 15	105	42	Weak	2½	" ..	5,740	27	20	58	"
Dion's	" 19	108	50	Stiff	3	" ..	5,800	27	20	60	"
Early Riga	" 7	96	34	"	2½	Beardless.	5,360	27	20	59½	"
Ladoga	" 16	105	42	"	3	Bearded..	5,120	27	..	57	Slightly.
Herrisson Bearded	" 15	105	40	Weak	2	" ..	5,660	26	40	58	Badly.
Countess	" 22	111	24	Stiff	2½	Beardless.	4,460	26	20	58½	"
Robin's Rust Proof	" 22	111	42	Fair	3	" ..	5,320	26	..	60	"
Beaudry	" 14	103	42	Weak	2½	Bearded..	5,360	25	40	58½	"
Australian No. 10	" 22	112	45	Fair	3¾	Beardless.	6,560	25	20	55	"
Minnesota No. 181	" 22	112	44	Weak	3	" ..	5,940	25	..	56	"
Bishop	" 16	106	45	Stiff	3	" ..	4,400	24	40	58	"
Red Swedish	" 20	109	40	Weak	3	" ..	4,880	24	20	59	"
Essex	" 20	109	47	"	3½	" ..	5,240	24	.	56	"
Harold	" 17	107	40	"	2	Bearded..	6,440	23	20	57½	"
Australian No. 25	" 22	112	46	Fair	3¾	Beardless.	5,600	21	20	55	"
Cassell	" 22	112	45	Weak	3½	" ..	6,040	20	40	56	"
Hastings	" 20	109	44	"	3	" ..	5,240	20	40	59	"
Australian No. 23	" 22	111	46	"	3½	" ..	5,920	19	20	55½	"
Chester	" 22	111	44	Fair	3	" ..	5,320	19	20	57½	"
Captor	" 14	103	39	"	3½	" ..	6,260	18	..	59	"
Australian No. 19	" 22	112	43	"	3½	" ..	6,200	18	..	55	"
Australian No. 27	" 20	110	45	"	3½	" ..	5,240	17	20	55½	"
Japanesse	" 28	99	43	"	3	Bearded..	1,860	17	40	50	Slightly.

AVERAGE Results of a Five Years' Test of Twelve Varieties of Wheat.

Name of Variety.	Years included.	Average Yield per Acre.	
		Bush.	Lbs.
Goose	1896, 1897, 1898, 1899, 1901	40	32
Monarch	1896, 1897, 1898, 1899, 1901	37	2
White Fife	1896, 1897, 1898, 1899, 1901	36	36
Crown	1896, 1897, 1898, 1899, 1901	36	32
Red Fife	1896, 1897, 1898, 1899, 1901	34	42
White Russian	1896, 1897, 1898, 1899, 1901	34	28
Hungarian	1896, 1897, 1898, 1899, 1901	32	38
Pringle's Champlain	1896, 1897, 1898, 1899, 1901	32	32
Huron	1896, 1897, 1898, 1899, 1901	32	22
Advance	1896, 1897, 1898, 1899, 1901	31	22
Colorado	1896, 1897, 1898, 1899, 1901	29	24
Herrisson Bearded	1896, 1897, 1898, 1899, 1901	27	42

FIELD PLOTS OF SPRING WHEAT.

All were sown on summer-fallow in the proportion of one and a half bushels of seed per acre.

Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Yield per Acre.	
		Acres.				Bush.	Lbs.
Red Fife	Clay loam	7	April 24	Aug. 12	110	28	42
Preston	"	5	" 24	" 14	112	33	36
"	Sandy loam	5	" 8	" 8	122	21	18
White Fife	"	5	" 22	" 12	112	23	30
Stanley	"	3	" 22	" 8	108	25	27
Red Fife	"	3	" 22	" 12	112	26	..
White Connell	"	2	" 23	" 12	111	26	45
Percy	"	2	" 24	" 8	106	28	..
Monarch	Clay loam	2	" 24	" 21	119	31	30
Speltz	"	2	" 25	" 16	113	47	10
Dawn	Sandy loam	1	" 10	" 7	119	22	..
Wellman's Fife	"	1	" 10	" 10	122	30	..
Ladoga	"	1	" 23	" 8	107	29	..
Crown	"	1	" 23	" 9	108	26	..
Advance	"	1	" 23	" 8	107	32	..
Huron	Clay loam	¾	" 25	" 12	109	41	24
Laurel	"	½	" 26	" 21	117	37	
White Russian	"	½	" 26	" 16	112	31	

THICK AND THIN SOWING OF WHEAT.

As many requests for information on this point reach the Experimental Farm, it was thought advisable to repeat the experiment. Evidently, fairly thick seeding, such as the usual 1½ bushels per acre, gives the largest return on such soil as that on the Experimental Farm.

The size of the plots for this test was 1-20 acre, and the soil was a rich sandy loam, which had been summer-fallowed, and they were all sown on May 2.

WHEAT—THICK AND THIN SOWING.

Name of Variety.	Amount of Seed sown per Acre.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
				Inches.		Inches.		Bush. Lbs.	Lbs.
Wellman's Fife.	6 pecks...	Aug. 20..	110	50	Stiff.....	3½	Beardless.	36 ..	59½*
" ..	5 " ...	" 20..	110	50	"	3½	" .	31 20	59½*
" ..	4 " ...	" 20..	110	50	"	3½	" .	23 20	56½*

* Badly rusted.

WHEAT AND FLAX MIXED.

This mixture is grown quite extensively in portions of the Red River Valley, in the United States.

One peck of flax and seven pecks of wheat are sown at the same time. The combined crop is cut and threshed, and the grain is separated with a fanning mill.

On the Experimental Farm, both the flax and the wheat germinated well, but the wheat soon took the lead and crowded out the flax, so that the stalks were exceedingly small and did not produce seed.

The size of the plots used for this test was one-twentieth of an acre, and the soil was a sandy loam, summer-fallowed.

Quantity of Wheat sown per Acre.	Quantity of Flax sown per Acre.	Date Sown.	Date Ripe.	Number of Days Maturing.	Yield per Acre.	Weight per Bushel.
					Bush. Lbs.	Lbs.
7 pecks.....	1 peck.....	May 15.....	August 28..	105	21 20	57½
7 "	None.....	" 15. ...	" 28..	105	28 40	59

WHEAT AND RAPE MIXED.

Where fall pasture is scarce, this mixture is used to a considerable extent. The rape is sown with the wheat at the rate of 2 pounds per acre, and both are allowed to grow together until harvest, when the binder is set high enough to miss the rape. After the crop of grain is cut, the rape is pastured off.

This year, the rape only grew on the outer edges of the plot and on any thin spot among the grain. Altogether, not more than 50 rape plants grew, and the yield of rape was not sufficient to pay for the seed sown.

The size of plot used for this test was one-twentieth acre. The soil was a sandy loam, summer-fallowed, and both plots were sown on May 15.

Quantity of Wheat sown per Acre.	Quantity of Rape sown per Acre.	Date Sown.	Date Ripe.	Number of Days Maturing.	Yield per Acre.	Weight per Bushel.
					Bush. Lbs.	Lbs.
7 pecks.	2 pounds..... .	May 15.....	August 28..	105	25 40	57
7 "	None.....	" 15.....	" 28..	105	28 40	59

SUMMER-FALLOW COMPARED WITH UNPLOUGHED STUBBLE.

This year the difference in favour of summer-fallow is less than usual, no doubt owing to the rank growth on the latter. The stubble land had only borne one crop since it was summer-fallowed.

The size of plots used for this test was one-fortieth of an acre, and the soil was a sandy loam. Both plots were sown on May 15.

Variety.	How Prepared.	Rust.	Ripe.	Length of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.
				Inches.	Inches.	Bush. Lbs.	Lbs.
Red Fife.....	Summer-fallowed ..	Little	Aug. 28...	45	3	28 40	59
"	Stubble,unploughed	" ...	" 28...	42	3	28 ..	58

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

Unlike last year's experience with this test, the conditions were quite favourable. A shower followed directly after the spreading of the fertilizers, and they were at once washed into the soil and the wind had no opportunity to blow them away.

From the accompanying tables it will be noticed that the plants treated with nitrate of soda have given the best returns.

The size of the plots was one-fortieth acre, the soil was a rich clay loam which had been summer-fallowed. All were sown on May 10, and all were harvested on August 23.

The variety of wheat sown on all the plots was Red Fife, one and one-half bushels of seed per acre.

Red Fife Wheat, Fertilizers Applied.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre of Wheat.	Weight per Bushel.
	In.		In.			Bush. Lbs.	Lbs.
100 lbs. per acre of nitrate of soda, ½ sprinkled when the grain was 2 in. high, balance when 6 in. high.....	49	Stiff..	3	Beardless.	4,000	39 20	60
200 lbs. per acre of nitrate of soda, ½ sprinkled when the grain was 2 in. high, balance when 6 in. high.....	47	" ..	3	" ..	4,300	40 ..	60¼
No fertilizer used.....	49	" ..	3	" ..	5,100	31 20	59⅔
Superphosphate, 400 lbs. per acre, spread just before sowing.	51	" ..	4	" ..	3,700	25 20	58¼
Muriate of potash, 200 lbs. per acre, spread just before sowing.....	48	" ..	3	" ..	4,200	30 40	59¾
A mixture, 200 lbs. superphosphate, 100 lbs. of nitrate of soda, 100 lbs. muriate potash, per acre, ½ spread before sowing, ½ when 2 or 3 inches high.....	50	" ..	3½	" ..	5,800	32 40	60

SELECTED AND UNSELECTED SEED.

During the harvest season of 1900, the largest heads were selected from the standing grain of thirty-four varieties of wheat and six of barley. The seed was sown this year for a comparison with unselected seed from the same plots.

The plots were all the same size, viz., 1-20 acre, and each pair was sown in close proximity. The accompanying tables give the result of each individual variety and also a summary which shows great variation in the returns, the average, however, shows that the unselected wheat yielded 9 pounds per acre more than the selected, and the selected barley 1 bushel 32 pounds per acre more than the unselected.

The soil was a sandy loam, summer-fallowed. The plots of wheat were sown from the 1st to the 7th of May, and those of barley on the 17th of that month.

WHEAT.

Name of Variety.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Lbs.	Bush.	Lbs.	Lbs.
Goose—Selected	5,140	41	..	62
" Unselected	4,820	42	20	62½
Huron—Selected	5,120	37	..	61
" Unselected	4,720	35	20	59
White Fife—Selected	5,380	37	..	60
" Unselected	5,380	34	20	60
Blenheim—Selected	5,200	36	40	59
" Unselected	5,460	32	20	58
Dions—Selected	5,340	36	..	61
" Unselected	5,800	27	20	60
White Russian—Selected	3,460	36	..	59¾
" Unselected	5,880	36	..	58½
Progress—Selected	5,380	35	20	59
" Unselected	3,180	37	..	60
White Connell—Selected	5,400	35	..	60
" Unselected	5,400	34	..	59¼
Crown—Selected	5,520	34	40	59
" Unselected	5,020	38	..	59½
Admiral—Selected	5,340	34	20	59½
" Unselected	4,700	37	20	59½
Colorado—Selected	5,340	34	20	60½
" Unselected	6,420	31	20	59
Beauty—Selected	5,660	34	..	58
" Unselected	5,300	35	40	58½
Stanley—Selected	5,660	34	..	58½
" Unselected	5,080	36	..	59½
Red Fife—Selected	5,140	34	..	59
" Unselected	5,140	36	40	60
Preston—Selected	4,940	34	..	60
" Unselected	4,940	31	..	58½
Laurel—Selected	6,080	33	40	57½
" Unselected	6,040	35	..	56
Weldon—Selected	6,180	33	40	59½
" Unselected	5,840	31	40	59
Campbell's White Chaff—Selected	3,500	33	20	60
" " Unselected	3,640	33	..	59
Mason—Selected	4,720	33	..	60¼
" Unselected	3,680	31	..	61
Rideau—Selected	5,120	32	40	59½
" Unselected	3,760	33	..	59
Dawn—Selected	5,280	32	..	58¼
" Unselected	4,440	33	20	59½
Hungarian—Selected	5,200	31	40	59
" Unselected	4,660	29	40	59½
Captor—Selected	5,680	30	20	57¼
" Unselected	6,260	18	..	59
Dufferin—Selected	4,900	30	..	59
" Unselected	3,860	30	40	59
Alpha—Selected	5,600	30	..	58
" Unselected	5,640	35	..	59
Monarch—Selected	5,100	30	..	59
" Unselected	5,220	36	20	59½
Ladoga—Selected	5,000	30	..	59½
" Unselected	5,120	27	..	57
Clyde—Selected	5,720	29	40	58½
" Unselected	4,540	36	40	59½
Beaudry—Selected	5,520	29	40	60
" Unselected	5,360	25	40	58½
Percy—Selected	4,740	29	20	58¾
" Unselected	4,180	29	20	60
Wellman's Fife—Selected	7,040	29	..	58½
" Unselected	5,060	34	40	59½
Advance—Selected	5,420	28	..	59
" Unselected	5,180	34	20	59
Blue Stem—Selected	4,900	26	..	56
" Unselected	4,900	31	40	57¼
Red Swedish—Selected	5,320	24	40	58
" Unselected	4,880	24	20	59

Summary.	Bush.	Lbs.
Average yield of 34 varieties, selected...	32	39
" " 34 " unselected	32	48

Barley.

Name of Variety.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Lbs.	Bush.	Lbs.	Lbs.
Odessa—Selected (1899)	3,800	50	..	46
" Unselected	3,300	26	32	45
Fulton—Selected	3,500	33	16	47
" Unselected	3,260	36	12	47
Harvey—Selected	3,320	28	36	48
" Unselected	4,060	42	24	48
Prize Prolific—Selected	2,910	20	30	46
" " Unselected	2,940	24	8	46
Sidney—Selected	2,860	19	28	47
" Unselected	3,460	25	40	47
Common—Selected	2,200	41	32	46½
" Unselected	3,200	29	8	46

Summary.	Bush.	Lbs.
Average yield of 6 varieties, selected	32	16
" " unselected	30	32

EXPERIMENT WITH SPELTZ.

This grain is still attracting considerable attention throughout the province, and numerous inquiries regarding it are received at the Experimental Farm.

A noticeable feature in connection with this grain during the past wet harvest, was the bright almost rust proof straw which remained quite bright in spite of the several weeks exposure in the stook. A stack of this straw has been saved for the purpose of testing its feeding value for cattle.

On rich summer-fallowed land the Speltz straw leaned badly, but not sufficient to prevent the binders from cutting all the way around the field.

The accompanying table gives the yield of Speltz, as compared with Red Fife wheat, American Beauty oats, and Mensury barley. The size of the plots was one-fortieth acre. The soil was a sandy loam, summer-fallowed.

In another part of this report will be found the particulars of the feeding value of this grain for steers.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Weight of Straw per Acre.	Weight of Grain per Acre.
				Lbs.	Lbs.
Speltz Wheat	May 15	Aug. 29	106	4,720	3,080
Red Fife Wheat	" 15	" 28	105	6,460	1,720
American Beauty Oats	" 15	" 28	105	4,480	2,320
Mensury Barley	" 17	" 20	95	3,660	2,320

SPELTZ—THICK AND THIN SOWING.

The unusual size and formation of the berry of speltz causes much uncertainty regarding the most suitable manner of setting the grain drill. The accompanying table gives the result of setting the Massey-Harris Shoe Drill, one bushel, one and a half bushels, and one and three-quarter bushels per acre.

The size of the plots was one-twentieth acre, and the soil was a sandy loam, which had been summer-fallowed.

Speltz Wheat—Thick and Thin Sowing.

Name of Variety.	Drill set for.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Weight per Bushel.
	Per Acre.				Ins.		Ins.		Bush. Lbs.	Lbs.
Speltz	1 Bushel	May 15	Sept. 6	114	43	Weak	3	Bearded	33 20	41
"	1½ "	" 15	" 6	114	43	"	3	"	37 20	43
"	1¾ "	" 15	" 6	114	43	"	3	"	46	43½

Summer-fallowed vs. Unploughed Stubble for Speltz.

The small difference of yield in favour of the summer-fallow is no doubt largely attributable to the abundance of rain during the growing season. The test was made on plots of one-twentieth acre. The soil was a clay loam.

Variety.	How Prepared.	Date of Sowing.	Ripe.	Length of Straw.	Length of Head.	Yield per Acre.	Weight per Bushel.
				Inches.	Inches.	Bush. Lbs.	Lbs.
Speltz	Stubble, unploughed.	May 15	Aug. 28	36	2	48 40	41½
"	Summer-fallow	" 15	" 29	47	2	51 20	44

ROTATION OF CROPS.

Two years ago, in accordance with your instructions, arrangements were made for a series of rotation plots, the principal object being the maintenance of the fertility of the soil, by ploughing under a leguminous crop every third year, instead of the usual summer-fallow.

The Soja beans were sown in rows 14 inches apart, using 60 pounds of seed per acre. The Red Clover was sown at the rate of 12 pounds per acre, and the mixed clovers in the proportion of 8 pounds of Alfalfa and 6 pounds of Alsike per acre. These leguminous plants were ploughed under when they reached their fullest development. The order of rotation is as follows :—

1899.	1900.	1901.
Soja Beans	Wheat	Oats.
Pease	Wheat	Wheat.
Tares	Wheat	Oats.
Red Clover	Wheat	Wheat.
Alfalfa and Alsike	Wheat	Barley.
Wheat	Oats	Soja Beans.
Wheat	Wheat	Pease.
Wheat	Oats	Tares.
Wheat	Wheat	Red Clover.
Wheat	Barley	Alfalfa and Alsike.
Oats	Soja Beans	Wheat.
Wheat	Pease	Wheat.
Oats	Tares	Wheat.
Wheat	Red Clover	Wheat.
Barley	Alfalfa and Alsike	Wheat.
Wheat	Wheat	Summer-fallow.
Wheat	Oats	"
Wheat	Barley	"
Wheat	Wheat	Oats.
Wheat	Barley	Oats.

RESULTS OF THIRD YEAR (1901) ON ROTATION PLOTS.

Plot.	Name of Variety.	Previous Crop.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Yield per Acre.	Weight per Bushel.
						Inches.	Bush. Lbs.	Lbs.
1	Oats—Banner	Wheat	May 8	Aug. 18	102	46	70 2	35
2	Wheat—Red Fife	Wheat	April 26	" 16	112	48	38 54	60
3	Oats—Banner	Wheat	May 8	" 18	102	47	73 24	34½
4	Wheat—Red Fife	Wheat	April 26	" 16	112	49	38 40	60
5	Barley	Wheat	May 22	" 17	87	37	37 2	46
6	Soja Beans	Oats	" 22	Ploughed under Aug. 12.				
7	Pease	Wheat	" 11	" " " 7.				
8	Tares	Oats	" 11	" " " 8.				
9	Red Clover	Wheat	" 22	" " " 9.				
10	Alfalfa and Alsike	Barley	" 22	" " " 10.				
11	Wheat—Red Fife	Soja Beans	April 26	Aug. 17	113	45	38 18	60
12	Wheat "	Pease	" 26	" 17	113	47	37 6	60
13	Wheat "	Tares	" 26	" 17	113	47	39 22	60
14	Wheat "	Red Clover	" 26	" 17	113	44	25 18	60
15	Wheat "	Alfalfa and Alsike	" 26	" 17	113	47	28 42	60
16	Summer-fallow	Wheat						
17	"	Oats						
18	"	Barley						
19	Oats—Banner	Wheat	May 8	Aug. 17	101	49	51 30	40
20	Oats "	Barley	" 8	" 17	101	45	55 ..	40½

SUMMARY OF RESULTS FOR THREE YEARS.

Plot.	Variety.	Yield per Acre.		Variety.	Yield Per Acre.		Variety.	Yield per Acre.	
	1899.	Bush.	Lbs.	1900.	Bush.	Lbs.	1901.	Bush.	Lbs.
1	Soja Beans.... ...	Ploughed under.		Wheat—Red Fife...	27	42	Oats—Banner.	70	2
2	Tease, Golden Vine			Wheat "	23	42	Wheat—Red Fife...	38	54
3	Pares.....			Wheat "	25	4	Oats—Banner.....	73	24
4	Red Clover.			Wheat " ...	15	14	Wheat—Red Fife...	38	40
5	Alfalfa and Alsike			Wheat "	11	42	Barley—Mensury....	37	2
6	Wheat—Red Fife.	27	44	Oats—Banner.	18	32	Soja Beans.....	Ploughed under.	
7	Wheat " ..	29	8	Wheat—Red Fife...	8	26	Pease, Golden Vine		
8	Wheat " ..	27	2	Oats—Banner.....	26	22	Tares.....		
9	Wheat " ..	21	0	Wheat—Red Fife...	6	12	Red Clover.....		
10	Wheat " ..	26	54	Barley—Odessa.....	12	44	Alfalfa and Alsike.		
11	Oats—Bavarian...	27	44	Soja Beans..	Ploughed under.		Wheat—Red Fife...	38	18
12	Wheat—Red Fife.	27	20	Pease, Golden Vine			Wheat "	37	6
13	Oats—Bavarian..	26	46	Tares.....			Wheat "	39	22
14	Wheat—Red Fife.	27	30	Red Clover..			Wheat "	25	18
15	Barley—Odessa....	38	38	Alfalfa and Alsike.			Wheat "	28	42
16	Wheat—Red Fife.	28	8	Wheat—Red Fife...	7	34	Summer-fallow.....		
17	Wheat " ..	29	16	Oats—Banner.....	33	12	"		
18	Wheat " ..	24	2	Barley—Odessa	15	32	"		
19	Wheat " ..	26	32	Wheat—Red Fife...	6	48	Oats—Banner.....	51	30
20	Wheat " ..	27	12	Barley, Odessa	16	44	Oats "	55	..

SUMMARY.

Although further time will be required before any definite conclusions can be drawn regarding the principal object of this experiment, there are already some suggestive results.

Better returns were obtained in both this and last year from ploughing under annual leguminous crops than from ploughing under clovers.

Plots one and three have each given more pounds of the same kind of grain in two years than No. 19 has in three years.

EXPERIMENTS WITH OATS.

Generally speaking, the oat crop throughout the province is above the average. On the Experimental Farm the yield has been good and the straw stiff, but the sample, owing to rust, is somewhat lighter than usual.

All the seed was treated with formalin, and there was a total absence of smut.

The newly introduced 'Tartar King Oat' is a new white, sided variety with a remarkably stiff straw, and very handsome in appearance, but the yield, both in the field and the smaller plots, is somewhat disappointing.

Another distinct new variety is 'Goldfinder Oats.' It has a somewhat thin and yellow oat, with a good stiff straw. The yield this year was better than that of the Tartar King, but not equal to many of the other varieties.

Average yields of twelve of the most promising varieties are also given. It will be noticed that Banner leads in productiveness.

The tests were made with sixty-five varieties, on plots of one-twentieth acre each. The soil was a sandy loam, summer-fallowed, and 2 bushels of seed was used per acre, sown with a drill.

Salzer's Big 4 and Milford were sown on June 1, and all the other varieties from May 10 to 13.

Oats—Test of Varieties.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Early Maine	Aug. 23	102	48	Fair	10	Branching	3,120	91	26	34½	Badly.
Improved American	" 23	102	55	Stiff	10	"	4,640	90	..	35	Slightly.
White Giant	" 24	103	56	Fair	10	"	4,960	89	14	33	Badly.
Danish Island	" 22	101	56	Stiff	9	"	4,060	89	14	35	Slightly.
Wide Awake	" 24	103	51	"	8	"	4,460	89	14	36	"
Siberian	" 22	101	55	"	12	"	4,880	88	28	35	Badly.
Golden Beauty	" 25	104	46	"	9	"	3,980	88	28	36	Slightly.
American Triumph	" 22	101	51	Fair	9	"	3,940	87	2	34½	"
White Schonen	" 22	101	50	"	10	"	4,640	87	2	37	"
Wallis	" 24	103	50	Stiff	11	"	2,180	86	16	36	Badly.
Lincoln	" 22	101	50	"	9	"	4,280	85	30	35	"
Banner	" 24	103	55	Fair	12	"	4,700	85	10	34	Slightly.
Irish Victor	" 20	99	48	Stiff	8	"	4,120	84	24	34½	"
Columbus	" 20	99	46	Weak	8	"	4,440	84	4	35½	Badly.
Bavarian	" 22	101	54	Stiff	9	"	3,940	84	4	36	"
Abundance	" 23	102	54	"	12	"	4,360	83	18	36	Slightly.
Golden Tartarian	" 27	106	50	"	11	Sided	4,780	82	32	32	Badly.
Holstein Prolific	" 23	102	50	Fair	9	Branching	4,340	81	26	36½	Slightly.
Hazlett's Seizure	" 14	93	50	"	12	"	4,640	81	6	37	Badly.
Improved Ligowo	" 20	99	50	"	11	"	3,940	81	6	37	"
Mennonite	" 22	101	48	"	10	"	3,980	80	..	33½	"
American Beauty	" 20	99	48	"	11	"	4,200	79	14	35½	Slightly.
New Zealand	" 26	105	56	Stiff	12	Sided	5,440	78	8	38½	None.
Waverley	" 25	104	55	"	11	Branching	4,640	78	8	35	Badly.
Rosedale	" 25	104	60	"	12½	Sided	3,100	76	16	37½	Slightly.
Sensation	" 20	102	55	Fair	10	Branching	3,640	75	10	39	Badly.
Early Gothland	" 25	104	55	Stiff	10½	Sided	5,440	75	10	38	Slightly.
Early Blossom	" 25	104	52	"	10	"	5,360	74	24	34½	"
Buckbee's Illinois	" 27	106	56	"	11	Branching	5,500	73	18	34½	Badly.
Early Archangel	" 22	101	50	"	9	"	4,300	73	18	37	Slightly.
Goldfinder	" 28	110	58	"	12½	Sided	4,900	73	18	38	Badly.
Cream Egyptian	" 11	90	48	"	8	"	4,140	72	12	40	"
Oderbruch	" 25	104	52	Fair	9	"	3,160	71	26	34	"
Russell	" 25	104	54	"	12½	Branching	4,880	71	6	33	"
Kendal	" 28	110	57	Stiff	10½	Sided	5,200	70	20	36	"
Abyssinia	" 23	102	52	Fair	10½	Sided	4,700	70	20	37	"
Olive	" 27	109	57	"	11	"	5,120	70	..	35	"
Golden Giant	" 27	106	51	Stiff	12	"	4,220	70	..	34½	"
Miller	" 25	104	50	Fair	10	Branching	5,220	70	..	33½	"
Bonanza	" 10	89	44	"	7	"	3,740	69	14	42	"
White Wonder	" 13	92	50	Weak	11	"	4,240	69	14	40	"
California Prolific Black	" 28	110	57	Stiff	10	Sided	5,440	69	14	32	"
White Russian	" 22	101	54	Weak	9	Branching	4,540	69	14	36	"
Joanette	" 28	110	48	"	10	"	4,660	68	28	34	"
Newmarket	" 23	102	48	Stiff	12	"	3,480	68	8	37½	Slightly.
Thousand Dollar	" 23	102	52	Fair	9	"	3,680	68	8	34½	Badly.
Holland	" 31	110	54	Stiff	12	Sided	4,900	67	22	30	"
Early Golden Prolific	" 25	104	54	Fair	10	Branching	3,620	67	2	34½	"
Master	" 23	102	52	Stiff	12½	Sided	4,340	66	16	36½	Slightly.
King	" 26	105	50	Fair	12	Branching	5,260	65	30	34½	Badly.
Oxford	" 23	102	53	Stiff	12½	Sided	4,360	65	30	37	Slightly.
Cromwell	" 22	101	56	Weak	12	"	5,280	65	10	33	Badly.
Black Mesdag	" 12	94	50	"	9	Branching	3,800	64	24	35½	"
Salines	" 26	105	54	Stiff	11	"	4,340	63	18	33	Slightly.
Prize Cluster	" 13	92	52	Weak	10	"	4,340	63	18	40	Badly.
Brandon	" 24	103	44	Stiff	8½	Sided	4,680	62	12	36½	"
Pioneer	" 22	101	46	"	10	Branching	4,700	61	26	37	"
Prolific Black Tartarian	" 25	107	51	"	9	Sided	5,440	60	20	32	Slightly.
Salzer's Big 4	" 31	91	50	Weak	8	Branching	2,120	60	20	34	Badly.
Pense	" 28	110	51	Stiff	10½	Sided	5,480	59	14	32	"
Tartar King	" 22	101	49	"	10	Sided	3,800	58	28	34	Slightly.
Black Beauty	" 26	108	52	Weak	12	Branching	4,740	57	22	33	Badly.
Flying Scotchman	" 20	99	51	Stiff	12	"	4,140	57	22	37½	Slightly.
Scotch Potato	" 26	105	52	"	12	"	5,660	45	10	33½	Badly.
Milford	Sept. 7	98	45	"	8½	Sided	4,820	31	6	18	"

AVERAGE Results of a Five Years' Test of Eight Varieties of Oats.

Variety.	Years included.	Average Yield Per acre.	
		Bush.	Lbs.
Banner	1896-97-98-99-1901	91	..
Golden Beauty	1896-97-98-99-1901	83	26
Early Golden Prolific	1896-97-98-99-1901	83	14
White Schonen	1896 97-98-99-1901	81	30
Holstein Prolific	1896-97-98-99-1901	81	..
Abundance	1896-97-98-99-1901	78	32
Improved Ligowo	1896-97-98-99-1901	75	26
Master	1896-97-98 99-1901	72	2

FIELD PLOTS OF OATS.

These were all sown on summer-fallow, with a drill, in the proportion of two bushels of seed per acre.

Variety.	Character of Soil.	Size of Plot.	Date Sown.	Date Ripe.	Number Days Maturing.	Yield per acre.	
		Acres.				Bush.	Lbs.
Ligowo Oats	Sandy loam	5	Apl. 25..	Aug. 16..	114	59	9
American Beauty	" ..	3	May 1..	" 19..	110	49	2
Tartar King	Clay loam	3	" 9..	" 21..	104	59	18
Waverley	"	3	" 14..	" 25..	103	69	9
Banner	Sandy loam	3	" 8..	" 20..	104	68	18
Abundance	"	2	" 1..	" 20..	111	75	9
Goldfinder	Clay loam	1	" 14..	" 31..	109	63	10

EXPERIMENTS WITH BARLEY.

Fifty-two varieties of barley were tested this year. The yield of nearly all the varieties was greatly lessened by rust, which attacked the plants very early this year. It was particularly bad in two-rowed sorts, discolouring the straw and shrivelling up the head.

Mensury, the leading variety for productiveness, has proved itself one of the best for this district. The plant is vigorous, the straw stiff and usually free from rust.

The Hulless varieties, both black and white, are just now being recommended highly, by interested parties, but these sorts have not proved satisfactory here. The straw is very weak and the yield of grain below many other kinds.

The two beardless varieties, Excelsior and Success, are also unsuitable for this province. The straw is very brittle, and owing to excessive and late stooling, the crop of grain ripens unevenly, and is light in weight.

The size of plots used for this test of varieties was one-twentieth acre. The soil was a sandy loam which had been summer-fallowed. All were sown on May 17 and 18, in the proportion of two bushels of seed per acre.

Barley—Six Rowed—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		In.	Lbs.	Bush. Lbs.	Lbs.	
Mensury	Aug. 20	95	41	Stiff	3½	3,660	48 16	46	Slightly.
Mansfield	" 12	87	44	"	3	3,100	47 24	46	"
Yale	" 16	91	39	Fair	3	3,640	47 4	46	Badly.
Garfield	" 20	95	40	Stiff	3½	3,180	46 12	47	"
Albert	" 12	87	38	Fair	2½	2,860	44 8	47	Considerably.
Phœnix	" 12	87	34	Stiff	4	2,760	44 8	49½	Slightly.
Argyle	" 16	91	42	Fair	3	4,100	43 36	47	Badly.
Petschora	" 16	91	38	Stiff	3½	3,600	41 32	47	"
Excelsior	" 12	87	46	"	3	3,140	40 40	41	"
Claude	" 20	95	49	"	3	3,840	38 36	47	"
Summit	" 16	91	39	"	3	3,200	37 24	47	"
Baxter	" 16	91	43	Weak	3	3,000	37 24	48	"
Hulless Black	" 18	93	40	"	3	3,520	36 32	61	"
Nugent	" 19	94	37	Stiff	2½	2,080	33 36	47	"
Royal	" 16	91	34	"	3½	2,580	33 36	47	"
Empire	" 20	95	36	"	3	2,600	33 16	46½	Slightly.
Blue Long Head	" 20	95	33	"	3½	2,800	33 16	46	Badly.
Surprise	" 19	94	36	"	2½	3,160	32 4	47	"
Rennie's Imp'v'd	" 17	92	43	Weak	2½	3,660	32 4	47½	"
Champion	" 13	88	37	Stiff	2½	2,200	30 40	41	Slightly.
Vanguard	" 14	89	41	"	3½	2,980	29 28	47	Badly.
Oderbruch	" 17	92	41	Weak	2	3,160	29 28	46	"
Success	" 18	93	42	"	2	2,660	29 28	40	Slightly.
Common	" 14	89	41	"	3	3,200	29 8	46	Badly.
Trooper	" 20	95	36	Fair	3	3,800	29 8	46	"
Brome	" 20	95	36	Weak	3	3,160	27 44	48	"
Pioneer	" 15	90	39	Stiff	3	3,880	27 24	49	"
Odessa	" 18	93	39	Weak	3½	3,300	26 32	45	"
Stella	" 20	95	37	Fair	3	3,460	21 32	47	"
Hulless White	" 12	87	32	Weak	2½	2,100	16 12	55	"

Barley—Two Rowed—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		Inches.	Lbs.	Bush. Lbs.	Lbs.	
Jarvis	Aug. 16	91	47	Fair	4	3,480	47 44	47	Slightly.
Gordon	" 20	95	44	Stiff	3	3,180	43 36	46½	Badly.
Harvey	" 20	94	43	Weak	4	4,060	42 24	48	"
Dunham	" 16	91	40	"	4	3,700	41 32	48	"
Cliffo.d	" 16	91	43	Fair	4	3,120	39 8	48	"
Fulton	" 20	94	40	Stiff	3	3,260	36 12	47	Slightly.
Logan	" 22	96	44	"	4	3,400	35 20	48	Badly.
Leslie	" 18	93	44	Fair	4½	2,800	35 20	50	"
Nepean	" 18	93	48	Weak	3½	3,880	31 32	47	"
Standwell	" 22	96	38	Stiff	3	2,840	30 20	47	"
Invincible	" 20	95	42	Fair	4	2,700	29 8	49	"
Kirby	" 19	94	40	Weak	3½	3,340	28 16	49	"
Victor	" 17	92	43	"	4	3,760	27 44	48½	"
Canadian Thorpe	" 20	95	45	Stiff	4	3,490	27 14	48	"
Bolton	" 15	90	34	Weak	4	3,640	26 12	48	"
Sidney	" 16	90	39	"	3½	3,460	25 40	47	"
Prize Prolific	" 22	96	39	"	3	2,940	24 8	46	"
French Chevalier	" 22	97	39	Stiff	4½	2,560	23 36	46	"
Newton	" 22	97	30	"	3	1,860	19 28	48	"
Danish Chevalier	" 22	96	32	Fair	4	3,280	19 8	45½	"
Beaver	" 22	96	30	Stiff	4	3,100	18 36	47½	"
Kinver Chevalier	" 22	97	36	Fair	4	3,060	17 24	44½	"

AVERAGE Results of a Five Years' Test of Twelve Varieties of Barley.

Name of Variety.	Years included.	Average Yield per Acre.	
		Bush.	Lbs.
Mensury	1896-97-98-99-1901	51	12
Trooper	1896-97-98-99-1901	50	..
Common	1896-97-98-99-1901	49	14
Phœnix	1896-97-98-99-1901	46	46
Nugent	1896-97-98-99-1901	46	32
Excelsior	1896-97-98-99-1901	45	14
Stella	1896-97-98-99-1901	44	26
Royal	1896-97-98-99-1901	43	32
Champion	1896-97-98-99-1901	43	6
Bolton	1896-97-98-99-1901	42	44
Newton	1896-97-98-99-1901	40	42
Danish Chevalier	1896-97-98-99-1901	35	34

FIELD PLOTS OF BARLEY.

All these were sown on summer-fallow ; soil clay-loam ; sown at the rate of two bushels of seed per acre.

Variety.	Character of Soil.	Size of Plot.	Date Sown.	Date Ripe.	Number Days Maturing.	Yield per Acre.	
		Acres.				Bush.	Lbs.
Mensury	Clay loam	3	May 20	Aug. 21	93	43	45
Bolton	"	2	" 21	" 14	85	34	19
Beaver	"	1	" 21	" 19	90	55	15
Invincible	"	½	" 21	" 19	90	32	46

SMUT PREVENTIVES FOR BARLEY.

This grain has been found the most difficult of all to treat successfully for smut. In certain seasons it seems very difficult to destroy the spores of this fungus. From the accompanying table in will be seen that the best results have been obtained this season from treatment with bluestone (sulphate of copper).

It is claimed that formalin gives the best results when the grain is covered with canvas for some hours after treatment, but judging from a comparison of plots No. 3 and No. 4, there was no apparent benefit from this method.

A series of experiments was also conducted in testing preventives of smut in wheat and oats, but all the plots, both treated and untreated, were this year equally free from smut.

Name of Variety.	How Treated.	Good Heads on 9 sq. ft.	Smutty Heads on 9 sq. ft.
Phœnix Barley	Steeped for 1 hour, in 1 lb. bluestone to 3 pails water, and dried	475	2
"	" " 4½ oz. formalin to 10 galls. water, and dried	480	52
"	Sprinkled with 9 oz. formalin to 10 galls. water, and dried	440	35
"	" 9 " " covered	400	36
"	" 1 lb. bluestone to 1 pail of water, and dried	410	00

EXPERIMENTS WITH PEASE.

The yield of pease this year was not quite an average one, but the sample was excellent, and with the exception of four varieties, the experiment was a very successful test of varieties.

Chancellor, Kent, Agnes and Mackay, were all more or less injured by cutworms.

From the accompanying table it will be seen that pease are quite productive here. There is an absence of pea-weevil, and were it not for the labour of harvesting, this crop would prove very remunerative.

The land was summer-fallowed the previous year. The plots were one-twentieth of an acre, and the soil a rich clay loam. All the varieties, fifty-seven in number, were sown from May 4 to May 8.

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
				In.	In.		Bush.	Lbs.	Lbs.
Paragon	Sept. 2	121	Fair	58	2½	Medium	43	..	65½
Gregory	" 7	126	Rank	68	3	Large	42	30	65½
Macoun	" 10	127	"	48	3	Medium	41	40	64½
Picton	Aug. 30	115	Fair	84	3	Large	41	20	65
Victoria	Sept. 9	126	Rank	75	3	"	41	20	62
New Potter	" 11	130	"	51	3	"	41	20	64½
Mummy	" 5	122	Fair	48	2½	Small	39	40	62½
King	Aug. 28	116	Rank	46	2½	Medium	38	50	65
German White	" 29	117	Fair	68	3	"	38	40	64½
Crown	Sept. 7	124	Weak	54	2½	Small	38	30	65½
Elliot	" 6	125	"	48	3	Large	38	30	64
Prince	" 7	126	Rank	84	3	"	38	..	64½
Alma	Aug. 29	114	Fair	65	2¼	Small	37	20	65
Fenton	Sept. 2	119	Medium	54	3	Large	36	40	64
Early Britain	Aug. 29	117	Weak	44	3	Medium	36	20	61½
Prussian Blue	" 27	115	Rank	63	2½	"	36	20	65½
Nelson	" 29	108	Fair	40	3½	"	36	10	66
Cooper	Sept. 3	122	Rank	56	2½	"	36	..	65
Arthur	Aug. 27	115	Fair	43	6	"	35	50	65
Perth	" 30	118	Weak	48	2½	Large	35	40	64
Duke	" 21	105	Rank	66	3	"	35	20	64
Harrison's Glory	" 31	116	Fair	54	2¼	Small	35	..	65
Golden Vine	" 31	119	Weak	52	2½	"	35	..	64½
Carleton	Sept. 7	124	Fair	60	2¾	"	34	50	64
Canadian Beauty	" 7	126	Rank	80	2½	Large	34	40	64
Chelsea	" 6	123	Fair	54	3	Medium	34	20	62
Archer	" 7	124	"	51	3	Small	34	20	65
Pride	Aug. 31	119	"	35	3	Medium	34	20	64
Lanark	Sept. 2	121	Weak	52	3	Large	33	50	63½
Wisconsin Blue	Aug. 31	116	Fair	54	2½	Medium	33	30	66
Oddfellow	" 26	111	"	48	2	"	33	20	67
White Wonder	" 20	108	"	20	3	"	33	20	63
Agnes	" 31	119	Weak	48	2½	Large	33	10	62½
Dover	Sept. 8	125	Fair	68	2½	Medium	33	..	64
French Canner	Aug. 20	108	"	50	3¼	Small	33	..	65
Grass	Sept. 10	127	"	66	2	"	32	20	63
Trilby	" 10	127	Rank	72	2½	Medium	32	..	62½
Vincent	Aug. 20	104	Fair	55	3	Large	32	..	63½
Creeper	" 19	103	"	60	2½	Small	31	50	65
Bruce	" 29	113	"	50	3	Medium	31	50	65
Kent	Sept. 7	124	Weak	36	3	Large	31	..	64
Large White Marrowfat	" 10	127	Rank	72	3	"	31	..	63
Prince Albert	" 11	130	"	73	2½	Small	31	..	63
Chancellor	Aug. 26	111	Weak	36	2½	Medium	30	40	64½
Bedford	Sept. 2	119	Rank	63	2¾	Small	30	20	65
Black-eyed Marrowfat	Aug. 21	105	"	70	3	Medium	30	..	64½
English Grey	Sept. 10	127	Fair	48	3	"	29	50	61½
Centennial	" 10	129	Rank	62	3	"	29	50	64
Daniel O'Rourke	Aug. 30	116	Fair	69	3	Small	29	40	65
Fergus	" 20	104	Rank	86	3	"	29	40	65
Mackay	Sept. 7	124	"	51	3	Large	29	..	63
Multiplier	" 10	127	Fair	70	2½	Small	28	40	62½
Herald	" 7	124	"	51	2¾	"	28	30	64
Elephant Blue	" 8	127	Rank	63	3	Medium	28	20	64
Pearl	" 7	126	"	78	3	Small	27	20	64
Bright	" 9	128	"	79	3	Medium	25	40	65
Elder	" 10	129	"	76	2½	Small	16	30	64½

Average Results of a Five Years' Test of Twelve Varieties of Pease.

Variety.	Years included.	Average Yield per Acre.	
		Bush.	Lbs.
Mummy	1896-97-98-99-1901	45	54
New Potter	1896-97-98-99-1901	44	48
Carleton	1896-97-98-99-1901	44	46
Pride	1896-97-98-99-1901	44	2
Kent	1896-97-98-99-1901	42	32
Mackay	1896-97-98-99-1901	42	8
Trilby	1896-97-98-99-1901	42	4
Crown	1896-97-98-99-1901	40	14
Prince	1896-97-98-99-1901	39	8
Prince Albert	1896-97-98-99-1901	38	54
Agnes	1896-97-98-99-1901	38	38
Creeper	1896-97-98-99-1901	36	42

Mixed Pease and Oats.

The labour of harvesting pease in the usual way, added to the risk of loss from severe wind storms, has always proved a serious obstacle to their cultivation in this province.

A small quantity of oats, mixed with the pease at seeding, usually keeps the combined crop from lodging, and permits of a large proportion of the crop being secured with a binder, and stooked and threshed in the usual manner. The small quantity of pease missed by the binder can be gathered by the store hogs, usually plentiful at this season of the year.

The size of plots in this test was one-twentieth acre, and the soil was a sandy loam, summer-fallowed.

Quantity of Peas sown per Acre.	Quantity of Oats sown per Acre.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Total Yield per Acre.	Weight per Bushel.
					Bush. Lbs.	Lbs.
2 bushel	1 peck	May 6..	Aug. 27..	113	46 20	43
2 "	2 "	" 6..	" 27..	113	57 20	38

Thick and Thin Sowing of Pease.

It is usually difficult to get a close stand of pease in this country. For this reason, it was expected that a somewhat heavier sowing than usually practised in the East would give the best results, but the result of this year's test does not appear to confirm this opinion.

The size of the plots for this test was one-twentieth acre, the soil was a sandy loam, summer-fallowed, and all were sown on May 8.

Name of Variety.	Amount of Seed sown per Acre.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Size of Pea.	Total Yield per Acre.	
	Bush.		Acre.					In.	Lbs		Bush.	Lbs.
Potter	2	Sand loam	1/20	May 8	Aug. 29	113	Fair	60	2½	Medium	33	40
"	2½	"	1/20	" 8	" 29	113	"	60	2¾	"	33	40
"	3	"	1/20	" 8	" 29	113	"	60	2½	"	32	20

THICK AND THIN SEEDING OF FLAX.

The size of the plots for the test was one-twentieth acre, the soil was a sandy loam which had been summer-fallowed.

The accompanying table gives the second sowing for this test. The first plots were sown on May 16, and were destroyed by cutworm.

Variety.	Amount of Seed sown per Acre.	Date of Sowing.	Length of Straw.	Date when Pulled for Fibre.	Weight of Straw per Acre.	Yield of Seed per Acre.		Weight per Bushel.
	Lbs.		In.		Lbs.	Bush.	Lbs.	Lbs.
Flax	40	May 31	26	Sept. 5	2,800	14	56	56
"	30	" 31	26	" 5	2,200	11	44	56
"	20	" 31	26	" 5	2,400	11	14	56

BUCKWHEAT—A VOLUNTEER CROP.

One of the objections to the cultivation of buckwheat in this country is the fact that the grain ripens so unevenly that the first-formed grain shells before the rest is fully matured, and the shelled grain, coming up in the next year's crops, injures the samples.

The shelled grain in last year's buckwheat plots was lightly covered this spring, and the yield, as will be seen by the following tables, was a good one.

Variety.	Date Sown.	Date of Ripening.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Lbs.	Bush.	Lbs.	Lbs.
Japanese	Autumn, 1900	Sept. 16	220	28	19	47
Gray	" 1900	" 16	500	35	20	48½
Silver Hull	" 1900	" 16	440	32	32	52

EXPERIMENTS WITH INDIAN CORN.

Fodder corn was somewhat later in maturing this year, but the crop was an average one.

North Dakota White and Pearce's Prolific, the two varieties which seem most desirable for this part of the province, both reached the late milk or roasting stage on September 1. The fields of these varieties grown for ensilage gave a very satisfactory yield. The corn was cut with a binder, and allowed to wilt for several days before being put into the silos, and already the ensilage is giving off an agreeable, malty odor, indicating good quality.

The seed was sown on May 29, in rows 30 inches apart, using about half a bushel of seed per acre. The crop was cut on September 5. Thirty-four varieties were under trial. The soil was a rich, black loam, which had been summer-fallowed. The yield was calculated from two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		In.							Tons.	Lbs.	Tons.	Lbs.
Thoroughbred White Flint	Rank.	99	Leafy	Aug. 22	Aug. 31	Sept. 4	.....	E. Milk	23	860	20	260
Salzer's All Gold	Fair.	111	Little	" 19	" 27	Aug. 31	Sept. 5	L. "	23	464	19	1,072
Yellow Long Eared	"	104	Leafy	" 13	" 20	" 29	" 1	L. "	21	1,956	17	716
N'rth Dakota White	"	81	Very leafy	" 16	" 22	" 27	Aug. 31	L. "	20	1,448	16	1,660
Pearce's Prolific	Rank.	96	Leafy	" 12	" 18	" 25	Sept. 1	L. "	20	1,184	17	1,772
Sanford	Fair.	93	"	" 13	" 21	Sept. 4	.....	E. "	20	920	14	1,436
Pride of the North	"	96	Little	" 20	" 25	Aug. 27	.....	E. "	20	656	19	1,600
Mammoth Eight Rowed Flint	Rank.	94	Leafy	" 12	" 20	Sept. 4	.....	E. "	19	1,732	17	320
Extra Early Huron Dent	Fair.	99	Little	" 17	" 25	Aug. 30	.....	E. "	19	1,600	21	1,560
Red Cob Ensilage	Rank.	115	Little	" 29	Sept. 5	.....	.....	Silk	19	1,600	20	1,052
Longfellow	"	99	Leafy	" 11	Aug. 17	Aug. 27	Sept. 5	L. Milk	19	1,204	17	1,904
Salzer's Superior Fodder	Fair.	118	Fairly	" 22	Sept. 5	.....	.....	Silk	19	940	21	1,692
Mammoth Cuban	Rank.	104	Little	" 22	Aug. 30	Sept. 5	.....	E. Milk	19	280	22	484
Giant Prolific Ensilage	"	101	Fairly	" 27	" 31	" 5	.....	E. "	18	1,752	18	1,752
Selected Leaming	Fair.	107	Little	" 17	" 22	Aug. 28	Aug. 31	L. "	18	1,752	19	1,336
Champion White Pearl	"	101	"	" 21	" 31	Sept. 4	.....	E. "	18	1,356	18	960
White Cap Yellow Dent	"	106	Fairly	" 18	" 26	Aug. 31	Sept. 5	L. "	18	1,224	17	1,772
Evergreen Sugar	Rank.	87	Fairly	" 20	" 30	Sept. 5	.....	E. "	18	1,092	15	888
King of the Earliest	Fair.	90	Little	" 20	" 17	" 26	Aug. 31	L. "	18	564	17	848
Cloud's Early Yellow	"	113	"	" 21	" 27	" 4	.....	E. "	18	300	20	656
Black Mexican	"	82	Fairly	" 17	" 25	Aug. 30	Sept. 5	L. "	18	168	20	260
North Dakota Yellow	"	92	Very leafy	" 12	" 19	" 28	" 1	L. "	17	1,904	19	16
Early Butler	"	96	Little	" 18	" 28	" 30	.....	E. "	17	1,376	20	1,316
Early Mastodon	"	108	"	" 21	" 30	Sept. 5	.....	E. "	17	1,112	16	1,264
Compton's Early	Rank.	90	Very leafy	" 11	" 18	" 27	Sept. 5	L. "	17	980	17	1,376
Kendall's Early Giant	Fair.	72	Fairly	" 10	" 17	" 27	Aug. 31	L. "	17	452	15	96
Country Gentleman	"	78	Little	" 20	" 28	" 30	.....	E. "	16	1,660	14	1,832
Canada White Flint	"	107	Leafy	" 12	" 20	" 29	Sept. 5	L. "	16	1,660	17	188
Angel of Midnight	"	97	Very leafy	" 16	" 25	Sept. 3	.....	E. "	15	1,152	15	1,548
Mitchell's Extra Early	Weak	62	Fairly	" 2	" 7	Aug. 20	Aug. 28	L. "	14	512	16	1,396
Black Mexican	"	72	"	" 7	" 12	" 26	" 27	L. "	11	1,496	13	928
Salzer's Earliest Ripe	"	69	Slight	" 2	" 7	" 16	" 25	L. "	11	1,364	16	1,264
Extra Early Szekely	"	80	Fairly	" 7	" 10	" 20	" 27	L. "	11	704	9	84
Yellow Six-Weeks	Fair.	69	Little	" 7	" 11	" 20	" 29	L. "	11	176	11	1,760

INDIAN Corn Sown at Different Distances Apart.

Name of Variety.	Distance between Rows.	Height.	Condition when Cut.	Weight per Acre, green, in Rows.	
	Inches.	Inches.		Tons.	lbs.
Longfellow	21	94	Early milk	16	1,616
"	28	94	"	16	1,377
"	35	94	"	16	1,943
"	42	94	"	17	603
Selected Leaming	21	101	"	19	527
"	28	101	"	15	1,538
"	35	101	"	15	548
"	42	101	"	15	548
Champion White Pearl	21	115	"	17	953
"	28	115	"	15	407
"	35	115	"	15	548
"	42	115	"	16	1,660

Average Yield at Different Distances Apart.	In Rows.	
	Tons.	lbs.
Average yield of green corn, 21 inches apart	17	1,698
" " 28 "	15	1,774
" " 35 "	16	346
" " 42 "	16	937

FIELD ROOTS.

All field roots, with the exception of carrots, have given large returns ; for some unexplained reason carrots were generally quite small.

EXPERIMENTS WITH TURNIPS.

Twenty-nine varieties of turnips were sown, but one of them, 'Webb's New Renown,' rotted in the ground and returns could not be obtained. With this exception the quality of the roots was excellent.

The soil chosen for these experiments was a sandy loam, which had been manured two years ago, and was summer-fallowed last year.

Two sowings were made of each variety, in every instance the early sown plots yielded considerably more than those later sown.

The first plots were sown on May 16, the second on May 30, and the roots from both were pulled on October 12. The estimate of yield has been made from the product of two rows each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Hall's Westbury	31	1,624	1,060	24	16	1,792	563	12
Hartley's Bronze	30	1,512	1,025	12	15	1,680	528	..
Prize Winner	30	720	1,012	..	17	320	572	..
Mammoth Clyde	27	1,704	928	24	15	360	506	..
Prize Purple Top	26	1,064	884	24	14	1,040	484	..
New Arctic	26	536	875	36	11	1,760	396	..
Sutton's Champion	26	272	871	12	13	400	440	..
Magnum Bonum	26	8	866	48	12	1,872	431	12
Imperial Swede	25	1,744	862	24	14	776	479	36
Kangaroo	25	424	840	24	9	1,536	325	36
Elephant's Master	24	1,368	822	48	10	328	338	48
East Lothian	24	576	809	36	12	552	409	12
Carter's Elephant	24	312	805	12	9	1,800	330	..
Perfection Swede	24	312	805	12	16	1,264	554	24
Bangholm Selected	23	1,784	796	24	13	1,984	466	24
Skirving's	23	464	774	24	14	1,040	484	..
Shamrock Purple Top	23	200	770	..	15	1,944	532	24
Jumbo	22	1,408	756	48	8	1,160	286	..
Halewood's Bronze Top	22	616	730	26	13	1,720	462	..
Monarch	21	1,560	726	..	13	400	440	..
Giant King	21	1,296	721	36	7	1,312	255	12
West Norfolk Red Top	20	920	682	..	11	1,760	396	..
Marquis of Lorne	19	1,864	664	24	11	176	369	36
Drummond Purple Top	19	280	638	..	6	1,200	220	..
Selected Purple Top	17	1,640	594	..	11	176	369	36
Selected Champion	17	1,640	594	..	12	1,872	431	12
Emperor	15	1,944	532	24	12	1,080	418	..
Champion Purple Top	14	1,568	492	48	13	1,984	466	24
Webb's New Renown	Completely destroyed by rot.							

EXPERIMENTS WITH MANGELS.

Twenty-five varieties of mangels were tested this year, and the yield was slightly above the average.

The seed of some of the varieties was washed out by a heavy rain, soon after sowing, leaving large vacancies in the rows. This accounts for the small return given by the last ten or twelve varieties. The soil on which the mangels were sown was a sandy loam, manured in 1899 and summer-fallowed last year.

Two sowings were made of each variety, the first on May 16, and the second on May 30, and the roots from both were pulled on September 24. The seed was sown in drills thirty inches apart, and the yield has been calculated from the weight of roots gathered from two rows each 66 feet long.

With four exceptions, the early sown plots gave the largest returns.

MANGELS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Half Long Sugar White	46	400	1,540	..	38	560	1,276	..
Mammoth Long Red	37	1,768	1,262	48	29	80	968	..
Selected Mammoth Long Red	37	1,240	1,254	..	26	272	871	12
Giant Yellow Globe	36	1,920	1,232	..	32	1,472	1,091	12
Norbiton Giant	35	488	1,174	48	20	128	668	48
Yellow Intermediate	34	1,168	1,152	48	13	1,720	462	..
Giant Yellow Intermediate	34	640	1,144	..	13	928	448	48
Half Long Sugar Rosy	32	680	1,078	..	24	1,368	822	48
Prize Mammoth Long Red	31	1,360	1,056	..	24	576	809	36
Triumph Yellow Globe	29	1,400	990	..	26	8	866	48
Gate Post	29	1,136	985	36	28	1,552	959	12
Mammoth Oval Shaped	28	760	946	..	19	1,600	660	..
Warden Orange Globe	28	232	937	12	17	1,904	598	24
Ward's Large Oval Shaped	27	384	906	24	22	88	734	48
Leviathan Long Red	26	800	880	..	21	240	704	..
Mammoth Yellow Intermediate	25	160	836	..	13	400	440	..
Gate Post Yellow	24	1,896	831	36	33	1,848	1,130	48
Lion Yellow Intermediate	24	1,104	818	24	20	920	682	..
Canadian Giant	21	504	708	24	34	640	1,144	..
Giant Yellow Half Long	21	240	704	..	18	960	616	..
Yellow Fleshed Tankard	19	1,600	660	..	19	1,864	664	24
Champion Yellow Globe	18	1,488	624	48	15	360	506	..
Golden Fleshed Tankard	18	432	607	12	25	1,480	858	..
Sutton's Yellow Globe	15	1,680	528	..	32	1,208	1,086	48
Red Fleshed Tankard	12	24	400	24	11	440	374	..

EXPERIMENTS WITH CARROTS.

The yield of carrots was a very irregular one, a few of the varieties giving large returns while others were scarcely an average crop.

The soil on which these roots were sown was a rich loam, summer-fallowed the previous year. The estimate of yield has been made from the roots produced on two rows each 66 feet long.

Nineteen varieties were tried. The first sowing was made on May 16, and the second on May 30. The seed was sown in drills eighteen inches apart, and all were pulled on October 12.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Giant White Vosges	21	240	704	..	12	1,080	418	..
Half Long White	20	480	674	40	15	800	513	20
Ontario Champion	20	480	674	40	13	840	447	20
White Belgian	19	1,600	660	..	13	1,720	462	..
New White Intermediate	19	1,600	660	..	12	640	410	40
Yellow Intermediate	17	1,640	594	..	11	880	381	20
Scarlet Intermediate	16	1,000	550	..	8	720	278	40
Long Yellow Stump Rooted	14	1,920	498	40	14	600	476	40
Iverson's Champion	14	1,920	498	40	14	600	476	40
Mamm. White Intermediate	11	880	381	20	17	1,200	586	40
Scarlet Nantes	10	1,560	359	20	7	960	249	20
Long Orange or Surrey	9	40	300	40	8	720	278	40
Long Scarlet Altringham	8	1,600	293	20	7	80	234	40
Carter's Orange Giant	7	1,400	256	40	14	1,920	498	40
Green Top White Orthe	6	760	212	40	16	1,880	564	40
Half Long Chantenay	6	320	205	20	13	1,720	462	..
Guerande or Ox-heart	5	1,880	198	..	16	1,000	550	..
Early Gem	4	1,240	154	..	13	840	447	20
White Vosges Large Short					14	1,480	491	20

EXPERIMENTS WITH SUGAR BEETS.

Seven varieties of Sugar Beets were tested. The soil was a sandy loam, manured in 1899, and summer-fallowed last year. The first plots were sown on May 16, and the second on May 30, and all were pulled on September 24. The yield per acre has been calculated from two rows each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Red Top Sugar	30	984	1016	24	29	1,136	985	36
Danish Red Top	29	344	972	24	28	232	937	12
Danish Improved	27	1,704	928	24	28	496	941	36
Wanzleben	25	160	836	..	22	1,672	761	12
Vilmorin's Improved	20	1,184	686	24	18	1,752	629	12
Royal Giant	18	960	616	..	18	696	611	36
Improved Imperial	18	960	616	..	26	1,856	897	36

EXPERIMENTS WITH POTATOES.

The season has been an exceptionally favourable one for potatoes. The abundant rainfall in late summer and the open fall encouraged rank growth of both vine and tuber.

The quality of the product was also above the average, many of the varieties being so dry that it was found difficult to boil them.

Formerly when small two-eye sets were used, some difficulty has been experienced from uneven germination, many sets failing to grow. For the past two years large sets have been used with excellent results, the germination being almost perfect.

The average yield of twelve of the most productive varieties covering a period of five years is also given.

The previous crop was pease. There was no injury from rot, and practically all were marketable.

The yield per acre has been estimated in each case from the product of one row 66 feet long.

All the varieties were planted on May 18, in rich clay loam, without manure, and were dug on October 5.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre.		Form and Colour.
					Bush.	Lbs.	
Hale's Champion	Fair	Sept. 1..	Medium..	Fair	737	..	Roundish, oval, white.
I. X. L.	Rank	Not ripe..	" ..	Good	623	20	Long, round, light pink.
Sabean's Elephant	"	" ..	Small	Poor	619	40	" round, white.
Columbus	"	" ..	Medium..	Fair..	616	..	" oval, deep pink.
Daisy	"	Sept. 1..	" ..	"	597	40	" " light pink.
State of Maine	"	Not ripe..	" ..	"	597	40	Flattish oval, white.
Prolific Rose	"	Sept. 1..	Small	Good	590	20	Roundish, oval, deep pink.
American Wonder	"	Not ripe..	Medium..	Fair	586	40	Long, round, white.
Brown's Rot Proof	"	" ..	" ..	"	575	40	Round, oval, deep pink.
Reeve's Rose	"	" ..	" ..	"	575	40	Flat oval, light pink.
Burnaby Seedling	"	" ..	" ..	Good	561	..	" "
White Beauty	"	Sept. 1..	" ..	"	553	40	" white.
Early Pride	"	" 1..	" ..	Fair	550	..	" light pink.
Brownell's Winner	"	Not ripe.	" ..	"	546	20	Irregular deep pink.
Enormous	"	" ..	Small	Poor	542	40	Roundish white.
Vigorosa	"	Sept. 1..	Medium..	Fair	539	..	Long, round light pink.
Extra Early Harvest	"	Not ripe..	" ..	Good	539	..	Roundish, white.
Carman No. 1	"	" ..	" ..	Poor	539	..	Flat, white.
Rose No. 9	"	" ..	Small	"	531	40	Long, flat, deep pink.
Bill Nye	"	Sept. 1..	Medium..	"	520	40	Roundish oval, white.
Money Maker	"	" 1..	" ..	Fair	520	40	Round, oval white.
Wonder of the World	"	" 1..	" ..	Good	517	..	" oval, light pink.
Lizzie's Pride	"	Not ripe..	" ..	Poor	517	..	Irregular white.
Quaker City	Fair	" ..	" ..	"	513	20	Long, flat, white.
Maule's Thoroughbred	Rank	" ..	" ..	Good	513	20	" oval, deep pink.
Vanier	"	" ..	Small	"	509	40	Roundish oval, deep pink.
Dreer's Standard	"	" ..	Medium..	"	509	40	Flattish oval, white.
Northern Spy	"	" ..	" ..	Fair..	506	..	Long, flat, deep pink.
American Beauty	"	" ..	Large	Good	506	..	" white.
Seedling No. 7	"	" ..	"	Fair	506	..	Long, oval, deep red.
American Giant	"	Sept. 1..	"	"	502	20	Roundish oval, white.
Clarke's No. 1	"	Not ripe..	Medium..	Poor	498	40	Long, flat, light pink.
Good News	"	" ..	" ..	Good	498	40	" round, deep pink.
Early Norther	"	Sept. 1..	" ..	"	498	40	" flat, pink.
Pearce's Extra Early	"	Not ripe..	" ..	"	495	..	" " deep pink.
Country Gentleman	"	Sept. 1..	Large	"	491	20	" deep pink.
Uncle Sam	"	Not ripe..	Medium..	Poor	487	40	Flattish, oval white.
Empire State	"	" ..	Large	Good	484	..	Long, round, white.
Maggie Murphy	"	" ..	Medium..	"	484	..	Flattish, oval, light pink.
Swiss Snowflake	Fair	" ..	" ..	"	480	20	Irregular, white.
Early Puritan	Rank	" ..	" ..	"	480	20	Long, round, white.
Late Puritan,	"	" ..	Small	Fair	476	40	Long, round, white.
Irish Cobbler	Weak	Sept. 1.	Large	Poor	476	40	Flattish, white.
General Gordon	Rank	Not ripe..	Medium..	"	476	40	Long, round, deep pink.
Rural Blush	"	" ..	" ..	Good	473	..	Round, oval, deep pink.
Cambridge Russet	"	Sept. 1..	Small	"	473	..	Long, round, deep russet.
Canadian Beauty	"	Not ripe..	Medium..	Fair	473	..	" " light pink.
Clay Rose	"	" ..	" ..	Good	469	20	Flat, oval, deep pink.
New Queen	"	Sept. 1..	" ..	"	469	20	Long, round, light pink.

Potatoes—Test of Varieties.

Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre.		Form and Colour.
					Bush.	Lbs.	
Chas. Downing	Rank	Sept. 1	Small	Good	465	40	Flattish oval, white.
Seedling No. 230	"	Not ripe	Medium	Fair	465	40	Roundish oval, white.
Houlton Rose	"	Sept. 1	Large	Good	465	40	Long, round, white.
Great Divide	"	Not ripe	Medium	"	462	..	Irregular, white.
Everett	"	"	"	"	462	..	Long, oval, deep pink.
World's Fair	"	Sept. 1	Small	"	462	..	Flattish white.
Bovee	"	" 1	Medium	Fair	462	..	Long, oval, light pink.
Penn Manor	"	" 1	"	Good	462	..	" deep pink.
Early White Prize	"	" 1	"	"	458	20	Round, oval, light pink.
Harbinger	"	" 1	"	"	454	40	Roundish oval "
Early Rose	"	" 1	"	"	440	..	" "
Stourbridge Glory	"	Not ripe	"	Fair	440	..	Oval, white russet.
Pearce's Prize Winner	"	Sept. 1	Small	Good	432	40	Flattish oval, white.
Delaware	"	" 1	Medium	Fair	425	20	Long, oval, white.
Beauty of Hebron	"	" 1	"	Good	425	20	" round, light pink.
20th Century	"	" 1	Large	Fair	425	20	" " deep russet.
Dakota Red	"	Not ripe	Medium	"	425	20	" flat, deep pink.
Early St. George	"	"	Large	Good	421	40	" oval, deep pink.
Pride of the Market	"	"	Medium	"	421	40	Roundish oval, white.
Chicago Market	"	Sept. 1	"	Fair	421	40	Long, round, white.
Rawdon Rose	"	" 1	"	Good	418	..	Roundish oval, light pink.
Carman No. 3	"	" 1	"	"	418	..	Long, round, white.
Lightning Express	"	" 1	"	"	418	..	Flattish, light pink.
Algoma	"	" 1	"	"	414	20	" oval, deep pink.
Lee's Favorite	"	" 1	Small	"	414	20	Long, oval, light pink.
New Variety No. 1	Fair	Not ripe	Large	"	414	20	Irregular, white.
Irish Daisy	Rank	Sept. 1	Medium	"	414	20	Long, oval, white.
Green Mountain	Fair	Not ripe	"	"	414	20	Flattish oval, white.
Holborn Abundance	Rank	"	Small	"	414	20	Round, white.
Early Michigan	"	Sept. 1	Medium	"	410	40	Long, flat, white.
Reading Giant	"	" 1	Small	"	403	20	Roundish oval, deep pink.
Thorburn	Fair	" 1	Medium	"	403	20	" light pink.
Early Market	Rank	" 1	"	"	399	40	Round, oval.
Sir Walter Raleigh	"	Not ripe	Small	"	396	..	Flattish oval, white.
Russell Seedling	"	"	"	"	392	20	" "
Early Six Weeks	Fair	Sept. 1	Medium	"	392	20	Round, light pink.
Vick's Extra Early	Rank	" 1	Small	"	388	40	Flat, pink.
Flemish Beauty	"	Not ripe	Medium	"	388	40	Oval, deep pink.
Troy Seedling	"	"	Small	"	381	20	Irregular, white.
Seneca Beauty	"	"	Medium	"	381	20	Round, deep pink.
Burpee's Extra Early	"	Sept. 1	Small	Fair	377	40	Roundish oval, light pink.
Record	"	Not ripe	"	Good	377	40	Long, round, white.
McIntyre	Fair	"	"	Poor	377	40	" "
Prize Taker	Rank	Sept. 1	"	Fair	374	..	Roundish oval, deep pink.
Honeoye Rose	"	" 1	Large	Poor	366	40	" light pink.
Rochester Rose	Fair	" 1	Small	Good	352	..	Long, round, light pink.
Rural No. 2	Rank	" 1	Large	"	352	..	Flattish oval, white.
Polaris	"	" 1	"	"	344	40	Long oval, deep pink.
Early Fortune	Weak	" 1	Medium	"	344	40	Roundish, oval, deep pink.
Livingstone	Fair	Not ripe	"	"	344	40	" white.
Seattle	Rank	Sept. 1	Large	"	337	20	Long, flat, light pink.
Early Ohio	Weak	" 1	Medium	"	333	40	Round, oval, light pink.
Fill Basket	"	Not ripe	"	"	330	..	" deep pink.
Early Sunrise	"	Sept. 1	Large	"	326	30	Long, oval, light pink.
Sharpe's Seedling	Fair	" 1	Medium	"	311	40	" "
Ohio Junior	Weak	" 1	"	"	311	40	Roundish oval, light pink.
Earliest of All	Rank	" 1	Large	Fair	308	..	Long oval, light pink.
Up to Date	Weak	Not ripe	Small	"	212	40	Flattish round, white.
Early Andes	"	Sept. 1	Medium	Good	209	..	Roundish oval, white.

AVERAGE Results of a Five Years' Test of Twelve Varieties of Potatoes.

Variety.	Years included.	Average Yield per Acre.	
		Bush.	Lbs.
Seedling No. 7	1897-98-99-1900-1901	402	36
Delaware	1897-98-99-1900-1901	393	4
Carman No. 1	1897-98-99-1900-1901	390	8
Clarke's No. 1	1897-98-99-1900-1901	382	48
Money Maker	1897-98-99-1900-1901	368	8
Lizzie's Pride	1897-98-99-1900-1901	365	12
New Variety No. 1	1897-98-99-1900-1901	365	12
Brownell's Winner	1897-98-99-1900-1901	352	44
Dakota Red	1897-98-99-1900-1901	344	40
Troy Seedling	1897-98-99-1900-1901	340	16
Seedling No. 230	1897-98-99-1900-1901	327	4
Carman No. 3	1897-98-99-1900-1901	321	56

GRASSES.

The season has been a very favourable one for all varieties of grass, the area devoted to this crop has been largely increased on the farm, but most of the plots and fields have been seeded some time and the yields for that reason are not very heavy. All were sown in June without a nurse crop.

Variety.	Area.	When Sown.	Yield per Acre.	
	Acres.		Tons.	Lbs.
Brome Grass	$3\frac{3}{4}$	1898	2	1,658
"	$\frac{1}{16}$	1899	2	1,200
Timothy	$\frac{1}{16}$	1899	1	200
Western Rye Grass	10	1900	3	....

CLOVERS.

When sown with a nurse crop of grain even the hardier varieties of clover only produce in this country small weak plants, which are almost invariably winter killed, but if sown alone, either on ploughed stubble or summer-fallow, and the weeds kept mowed during the summer, the plants become sufficiently strong to withstand the winter, and give a fair return the following summer.

Perhaps the best clover for general cultivation in the western portion of the province is Alfalfa or Lucerne. This should be sown on land free of grass or perennial weeds, in the proportion of thirty pounds of seed per acre. The mower should be run over the land several times during the first year to destroy all annual weeds before they go to seed and the perennial weeds should be hoed or pulled out. The young clover plants are very weak during the first year and must have every opportunity of growing.

The greatest obstacle to clover growing on this farm is the ground or pocket squirrel. This small animal is very fond of clover roots, and if not caught, soon destroys a large proportion of the plants. As they seldom appear above the surface, their run-ways require to be opened ; a spring trap set below the surface of the ground and covered with a board to exclude the light ; by this plan they are generally caught in a short time.

Mammoth Red, Common Red and Alsike were grown during the past year for ploughing under, but only Alfalfa or Lucerne was grown for hay. A one-twentieth acre of this variety yielded in the proportion of 1 ton 300 pounds of dry hay per acre in one cutting. It is usual to make two cuttings each year of Alfalfa, but the first cutting was delayed so long owing to the wet weather that there was not time for a second cutting to grow. Alfalfa should be cut on the first appearance of blossom. If the cutting is delayed after this date the plants become woody and the second cutting is greatly lessened.

MILLETS.

Eight varieties of millet were sown on May 31, in plots of 1-20 acre, but not enough of the seed germinated to make a stand of plants, and the experiment was of no value. On June 8, a second sowing was made of Japanese and Common Millet, the only varieties of which we had seed. As rains were frequent at this time the germination was rapid and a very fair crop was harvested.

The size of the plots was 1-10 acre, the soil a rich clay loam, which had been summer-fallowed.

Both varieties were sown with an ordinary grain drill, 6 inches apart.

Variety.	When Sown.	When Cut.	Yield per Acre.	
			Bush.	Lbs.
Japanese	June 8	Sept. 10	3	1,400
Common	June 8	Sept. 10	2	1,760

SUNFLOWERS.

A 1-40 acre plot of Mammoth Russian Sunflowers was sown on May 31, and cut on October 10. The height was seven feet, and the yield 1 ton 1,000 pounds of heads per acre. The soil was a clay loam summer-fallowed.

CATTLE.

The herd of cattle on the Brandon farm now consists of the following animals :—

Name of Animal.	Breed.	Age.	Weight.
			Lbs.
Lord Lossie	Shorthorn	4 years	2,220
Violet	"	4 "	1,185
Mary of Brandon	"	2 "	930
Esther	"	4 "	1,295
Prairie Buttercup	"	19 months	790
Eva	"	17 "	730
Sheba of Brandon	"	7 "	470
Roxy of Brandon	"	4 "	290
Prince Charlie	Ayrshire	18 "	980
Primrose	"	3 years	1,195
Bonnie Doon	"	22 months	880
Hugh John	"	22 "	1,090
Siepkje of Brandon	Holstein	3 years	1,290
Richard Lyons	Guernsey	4 "	1,925
Lady Jane Grey	Grade	13 "	1,260
Pansy	"	7 "	1,297
Rose	"	14 months	795
Reddy (steer)	"	3 years	1,310
Dick "	"	2 "	1,200
Pearl	"	6 months	400

Milking Cows.

The accompanying table gives the length of the milking period and the weight of milk given, by a number of the Experimental Farm cows for the past few years.

Name of Cow.	Age.	Breed.	Milking Period.	Pounds Milk.
	Yrs.			
Violet	4	Shorthorn	291 days ending April 21, 1900	2,834
"	5	"	277 " Mar. 16, 1901	3,331
Esther of Smithfield 3rd	4	"	350 " Mar. 16, 1901	4,837
Princess Lida 2nd	6	Holstein	313 " May 24, 1895	8,483
"	8	"	531 " Nov. 17, 1897	7,517
Lida of Brandon	3	"	341 " Dec. 11, 1897	7,336
"	5	"	387 " Feb. 28, 1899	8,261
Siepkje 3rd Queen	11	"	261 " Jan. 5, 1899	7,179
Lida's, Princess of Brandon	4	"	301 " Jan. 9, 1900	6,054
" "	5	"	332 " June 15, 1901	4,967
Dandy	7	Ayrshire	442 " Mar. 14, 1896	9,167
Pansy	3	Ayrshire Grade	314 " Aug. 14, 1897	5,124
"	4	"	373 " Oct. 7, 1898	5,245
"	6	"	358 " April 22, 1900	8,252
Violet	5	Shorthorn Grade	155 " Feb. 17, 1900	1,085
"	6	"	277 " Mar. 16, 1901	3,331
Lady Jane Grey	9	Grade	311 " Feb. 23, 1897	6,815
"	10	"	306 " Mar. 19, 1898	7,492
"		"	348 " May 2, 1899	8,094
"		"	179 " Dec. 7, 1899	5,705
"		"	305 " Feb. 21, 1901	7,416

EXPERIMENTS IN FEEDING STEERS.

DEHORNING AND ITS EFFECT ON CATTLE.

This experiment was a continuation of a similar one made last year, particulars of which can be found on page 363 of last year's annual report.

The steers were apparently all three years old, Shorthorn and Hereford grades, very uniform in quality and size.

The dehorning was done with a sharp carpenter's saw, as described in last year's report, and the operation was a success with all but one of the animals. This steer having a deformed horn, the cutting had to be done very close to the head, causing a profuse bleeding. This stopped in an hour or two, but broke out again during the night, and the animal was found dead in the morning. While it is thought to be an advantage to cut the horns moderately close to the head, it is, apparently, possible to cut too close. Cutting done on a level with the roots of the hair surrounding the horn has given us good results here.

Owing to the above accident, only four steers were used in each group, instead of five, as in last year's test. Two of the groups were dehorned, and one was not dehorned.

One of the dehorned groups was fed in a stall, loose, while the other was tied up alongside of the group with the horns.

The eight animals were tied in double stalls with chains; the four united animals were confined in a stall, 10 feet by 28 feet, and were fed in a trough running the length of the stall.

When purchased, in November, 1900, the steers cost $3.25 per hundred pounds, and they sold on April 20, 1901, for $4.60 per hundred pounds.

This experiment, like the one conducted last year, would lead us to the conclusion that dehorning has very little effect on the fattening of the animals.

RATION FED.

During the first four weeks, Nov. 30 to Dec. 28, 1900, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	7
Bran	5

During second four weeks, Dec. 28 to Jan. 25, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	7

During third four weeks, Jan. 25 to Feb. 22, 1901, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	9

During fourth four weeks, Feb. 22 to March 22, 1901, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	11

During fifth four weeks, March 22 to April 19, 1901, each steer received per day :

	Lbs.
Straw	10
Ensilage	23
Chop	11

DESCRIPTION OF FODDER.

The straw was a mixture of wheat and oats. The fodder corn was made from early ripening varieties, well cured in stooks outside, and only drawn in as wanted. The chop consisted of one-third each of wheat screenings, oats and barley, and the ensilage was made from early ripening varieties of corn.

COMPARATIVE GAINS.

Horned and Tied Up.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 30	4,645 lbs.		
Weight end of 1st period	Dec. 28	4,875 "	230 lbs.	
" 2nd "	Jan. 25	4,995 "	120 "	
" 3rd "	Feb. 22	5,160 "	165 "	
" 4th "	Mar. 22	5,420 "	260 "	
" 5th "	April 18	5,497 "	77 "	852 lbs.

COMPARATIVE GAINS—*Concluded.*

Dehorned—Tied.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 30	4,650 lbs		
Weight end of 1st period	Dec. 28	4,796 "	146 lbs.	
" 2nd "	Jan. 25	4,889 "	93 "	
" 3rd "	Feb. 22	4,980 "	91 "	
" 4th "	Mar. 22	5,215 "	235 "	
" 5th "	April 18	5,290 "	75 "	640 lbs.

Dehorned—Loose.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 30	4,595 lbs		
Weight end of 1st period	Dec. 28	4,801 "	206 lbs.	
" 2nd "	Jan. 25	4,975 "	174 "	
" 3rd "	Feb. 22	5,075 "	100 "	
" 4th "	Mar. 22	5,367 "	292 "	
" 5th "	April 18	5,447 "	80 "	852 lbs.

COST OF FEEDING EACH LOT OF FOUR STEERS.

5,600 pounds of straw at $1 per ton	$ 2 80
2,240 pounds of corn fodder at $4 per ton	4 48
11,536 pounds of ensilage at $2 per ton	11 53
5,040 pounds of chop at 75 cents per hundred	37 80
560 pounds of bran at $10 per ton	2 80
	$59 41

SUMMARY OF RESULTS.

—	First Cost of Steers.	Value of Feed Consumed.	Price Sold for.	Profit.
Horned	$150 96	$59 41	$252 86	$42 49
Dehorned—tied	151 12	59 41	243 34	32 81
" loose	149 33	59 41	250 56	41 82

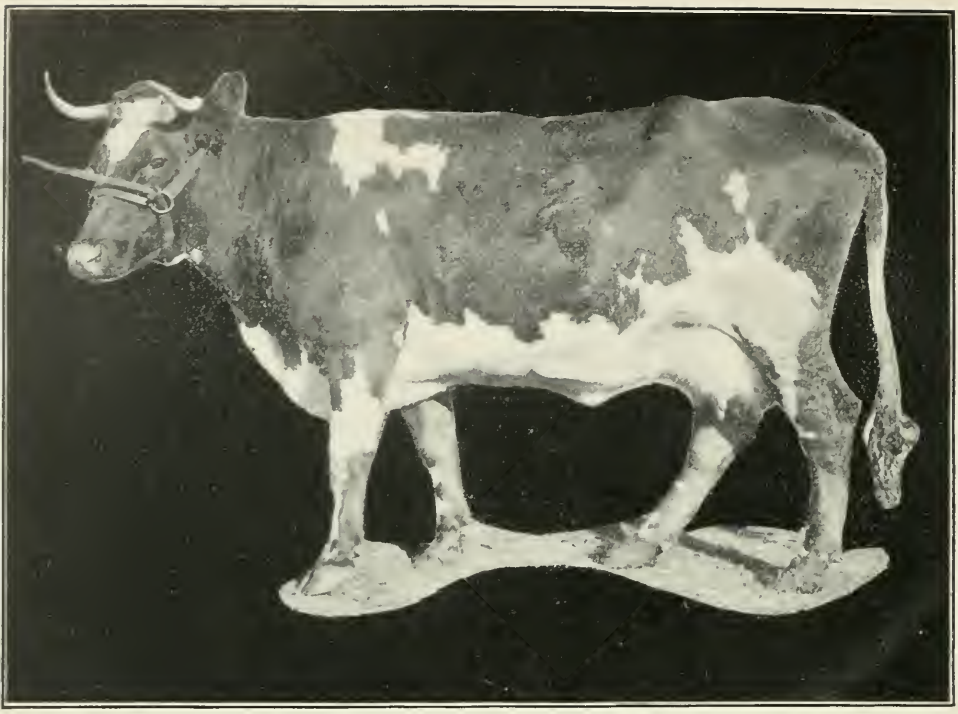
SPELTZ AS FEED FOR STEERS.

As stabling is somewhat limited on the Experimental Farm, only four steers could be used in this experiment. All were three-year-old Shorthorn grades, uniform in size and quality.

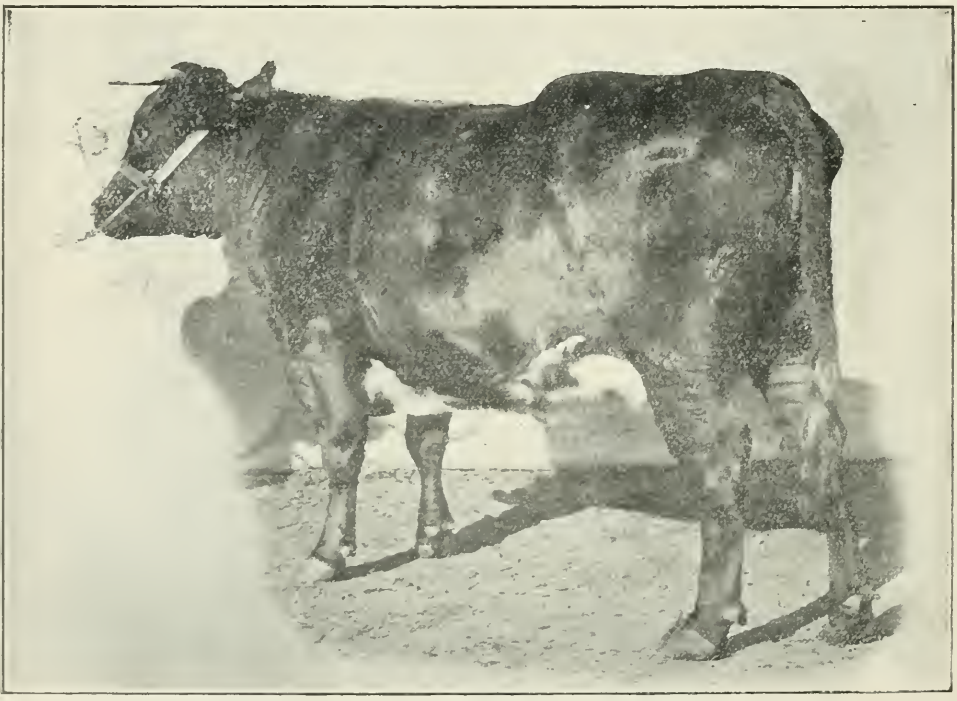
They were purchased in November, 1900, for $3.25 per hundred pounds, live weight, and were sold in April for $4.60 per hundred pounds.

All were tied in double stalls and fed a similar ration except that one group received chop composed of one-third oats, one-third wheat screenings and one-third barley, and the other group received an equal quantity of chopped Speltz, which was ground with the chaff on.

It will be noticed that the steers fed on Speltz made a somewhat larger profit than those fed on mixed grain.



Ayrshire Grade Cow Pansy.



Shorthorn Grade Cow Violet.

COMPARATIVE GAINS.

Steers Fed on Speltz.	Date.	Weight.	Gain.	Total Gain.
Original weight	Dec. 28	2,502 lbs		
Weight end of 1st period	Jan. 25	2,582 "	80 lbs.	
" 2nd "	Feb. 22	2,632 "	50 "	
" 3rd "	Mar. 22	2,765 "	133 "	
" 4th "	April 18	2,810 "	45 "	308 lbs.

Steers Fed on Mixed Grain.	Date.	Weight.	Gain.	Total Gain.
Original weight	Dec. 28	2,497 lbs		
Weight end of 1st period	Jan. 25	2,542 "	45 lbs.	
" 2nd "	Feb. 22	2,560 "	18 "	
" 3rd "	Mar. 22	2,675 "	115 "	
" 4th "	April 18	2,725 "	50 "	228 lbs.

COST OF FEEDING EACH LOT OF TWO STEERS.

2,240 pounds of straw at $1 per ton	$ 1 12
840 pounds of corn fodder at $4 per ton	1 68
4,648 pounds of ensilage at $2 per ton	4 65
2,128 pounds of chop at 75 cents per hundred	15 96
	$23 41

SUMMARY OF RESULTS.

—	First Cost of Steers.	Value of Feed Consumed.	Price Sold for.	Profit.
Steers fed on speltz	$81 31	$23 41	$129 26	$24 54
Steers fed on mixed grain	81 12	23 41	125 35	20 82

SPELTZ AS FEED FOR STEERS.

During first four weeks, Dec. 28 to Jan. 25, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	7

During second four weeks, Jan. 25 to Feb. 22, 1901, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	9

During third four weeks, Feb. 22 to March 22, 1901, each steer received per day :

	Lbs.
Straw	10
Corn fodder	5
Ensilage	20
Chop	11

During the fourth four weeks, March 22 to April 19, 1901, each steer received per day :

	Lbs.
Straw	10
Ensilage	23
Chop	11

Brome Grass Pasture for Steers.

The field selected for this purpose was seeded to brome grass, on summer-fallow, in August, 1898. The area was one acre. Four pigs were pastured on it during 1899 and 1900, and any grass they did not consume was cut and made into hay.

One of the animals was a Shorthorn grade, twenty-three months old, and weighing 1,090 pounds on May 8, when the experiment was commenced, the other was a Guernsey grade twenty-one months old, and weighing 980 pounds.

Both steers were kept closely confined to the field from May 8 to August 28. A small building afforded them shelter during severe storms.

Water was given them twice a day, but no grain or other feed in addition to the pasture. There was abundant pasture for the steers until August 28, when it became very short and the cattle were removed.

The accompanying tables give particulars of this experiment.

Comparative Gains.

Shorthorn—Grade Steer 'Reddy.'	Date.	Weight.	Gain.	Total Gain.
		Lbs.	Lbs.	Lbs.
Original weight	May 8....	1,090	.....	
Weight end of 1st four weeks	June 5....	1,215	125	
" 2nd "	July 3....	1,250	35	
" 3rd "	" 31....	1,300	50	
" 4th "	Aug. 28....	1,335	35	245
Guernsey—Grade Steer 'Dick.'				
Original weight	May 8....	980	.....	
Weight end of 1st four weeks	June 5....	1,080	100	
" 2nd "	July 3....	1,130	50	
" 3rd "	" 31....	1,190	60	
" 4th "	Aug. 28...	1,225	35	245

Total gain for the two steers on one acre of brome grass pasture for four months equals 490 pounds, at 3½ cents per pound, equals $17.15.

BULL SERVICE.

The bulls on the Experimental Farm have all been available for service to the farmers and others at a nominal figure. This privilege has been readily taken advan-

tage of, with the result that the stock in this neighbourhood has greatly improved in character since the establishment of the Experimental Farm.

During the past two years, the three bulls on the farm have served 193 cows. This is in addition to the Experimental Farm herd. Eighty-two cows were served by the Shorthorn, 72 by the Guernsey, and 39 by the Ayrshire.

Importance of the Sire.

A very striking instance of the prepotency of the sire is shown in the form and milking record of the two grade cows 'Violet' and 'Pansy.' These were both from the same grade cow, 'Daisy.' Violet's sire was a beefy Shorthorn bull, and Pansy's a large Ayrshire bull. Both take after their respective sires in appearance. The plate near the beginning of this report was made from photographs of these animals. From the accompanying table, it will be seen that the Ayrshire-grade, not only gave the largest quantity of milk per day, but her milking period was also much longer.

Name of Cow.	Breed.	Milking Period.	Pounds Milk.	Number Days.	Milk per Day.	
					Lbs.	Oz.
Violet	Shorthorn—Grade	Aug. 10, 1899 to Feb 17, 1900.	1,076	191	5	10
Pansy	Ayrshire—Grade	Sept. 29, 1897 to Oct. 7, 1898.	5,241	373	14	..
Violet	Shorthorn—Grade	Aug. 15, 1900 to Jan. 17, 1901	1,085	155	7	..
Pansy	Ayrshire—Grade	Apl. 29, 1899 to Apl. 22, 1900	8,252	358	23	..

SWINE.

The herd of swine on the farm continues in good health, and consists of the following animals :—

Name.	Breed.	Age.
Royal Victor	Berkshire	3 years.
Neepawa Bob	"	10 months.
Minnie Merle 3rd	"	2 years.
Three pigs	"	3 months.
Amy's Choice 2nd	Tamworth	3 years.
Nina of Brandon	"	3 "
Brandon Princess	Improved Yorkshire	8 months.
Brandon Chief	" "	7 "
Four Cross-breds	Berkshire Sow x Tamworth Boar	

POULTRY.

The fowls have kept quite healthy, and seventy chicks were raised during the year.

The flock now consists of 48 Light Brahmas, 13 White Plymouth Rocks and 21 Black Minoreas.

Fattening of Brahmas Compared with Plymouth Rocks.

Four Brahmas and an equal number of White Plymouth Rocks were shut up in slatted pens, each 2 x 3 feet, and fed all they would eat of finely-ground grain, consisting of one-third each of oats, wheat and barley. This was given, in troughs, mixed with skim milk to about the consistency of thin porridge.

In the estimate of cost, the meal has been valued at $1 per hundred pounds.

From the accompanying tables, it will be seen that the Brahmas produced the cheapest meat by one-third of a cent per pound. The Plymouth Rock fowls presented the best appearance, being more plump and shapely than the Brahmas.

LIGHT BRAHMAS.

Weight September 24.		Weight October 8.		Weight October 22.		Gain.		Cost.	Cost Per Pound Live Weight.
Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Cents.	Cents.
20	9	25	8	29	11	9	2	34	$3\frac{3}{4}$

WHITE PLYMOUTH ROCKS.

18	5	22	12	26	5	8	..	32	4

OATS COMPARED WITH MIXED GRAIN AS A FATTENING RATION.

Eight Light Brahmas were used for this test. They were divided into two lots, nearly equal in weight, and shut up in separate feeding pens. One pen was fed with oats alone, ground fine and mixed with skim milk ; the other pen was fed with grain, consisting of one-third each of oats, wheat and barley.

The accompanying table shows that the pen fed with oats made the greatest gain and at the least expense.

Grain Fed.	Weight November 2.		Weight November 22		Gain.		Cost.	Cost Per Pound Live Weight.
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Cents.	Cents.
Oats	23	11	32	..	8	5	31	$3\frac{7}{16}$
Mixed grain	23	13	31	4	7	7	29	$3\frac{9}{16}$

BEES.

Of the eight colonies of bees placed in the cellar last winter, six wintered safely, and two died from diarrhœa. These two hives were located close to, but not touching, an outside stone wall, and the frames were quite damp and mouldy in the spring. One of the hives lost its queen during the winter or early spring. This fact was first discovered by noticing that the bees failed to gather pollen. A queen was at once procured from the south and introduced by means of the shipping case. The bees adopted her at once, quickly became populous, and this colony was one of the largest producers on the farm.

With one exception, the colonies on the Experimental Farm have been kept for years without intermixture from outside sources, and they are exceedingly tame ; but one colony, supplied with an imported queen this year, is decidedly cross and attacks the attendant on the least provocation. It will be interesting to watch the effect of continued gentle treatment on this colony.

The hives were placed on their summer stand on April 19, and at once worked freely on willow and poplar blossom.

Although a part of the season was too cloudy and wet for the best results, the months of July and August were bright and sunny, and the yield of honey for the season averaged 30 pounds per hive, spring count. The quality of the honey was excep-

tionally good, and found ready sale at from 10 to 15 cents per pound for the extracted article.

The honey of this province is very largely obtained from wild flowers, and seldom varies in quality during the season. Nearly all the surplus is gathered during the months of July and August, the other months yielding only sufficient to keep up breeding.

Seven additional swarms were hived during the summer. Six of these were July swarms and one in August. All these became strong before winter, and the early July swarms were among the most productive colonies of the year.

The first extracting was done on July 22, and the first drones were killed on September 9. It is found advisable to place the summer stands among the shelter of trees and only about 4 inches from the ground. This enables the heavy laden bees to reach their hive readily, and saves considerable loss from the strong winds prevailing here.

Although our winters are usually very long, there is generally very little trouble in wintering bees in this province, providing the cellar is dry and dark and the temperature is kept from 35 to 45 degrees. In the fall, before placing the bees in the cellar, the temperature should be carefully ascertained, and unless below 50 degrees, the bees should not be moved from their summer stand until the cellar has cooled. A high temperature causes uneasiness and much loss.

HORTICULTURE.

GENERAL REMARKS.

Notwithstanding some drawbacks, the past season has certainly been a favourable one from a horticultural standpoint. The condition of the soil in the spring was favourable to early germination, and early sown vegetables, such as onions, lettuce, &c., progressed rapidly, a necessary essential to success in the case of vegetables requiring a long growing season. During May, we experienced a long spell of hot and dry weather, the thermometer registering as high as 95 degrees Fahr. in the shade. On the evening of May 24, the thermometer dropped to 28 Fahr., but the only noticeable damage from this cause was the curling of the leaves of the Native Ash (*Fraxinus pennsylvanica lancelolata*) and the Native Oak (*Quercus macrocarpa*). A continued low temperature from this date culminated in a heavy rainfall on June 3 (·94 of inch), and, with a still falling temperature, we were visited with another heavy rain on the evening of the 5th, which changed during the night to snow, loading the branches of the trees so heavily as to break a considerable number of them, also badly smashing the stems of the taller-growing varieties of herbaceous perennials. The most serious damage in this connection was sustained by the hedges, in many instances the centres being laid open, and pruning had to be exercised judiciously throughout the balance of the season in order to overcome the effects. The morning of June 6 was bright, and the snow rapidly disappeared, but unfortunately the thermometer fell in the evening to 27·5 Fahr., seriously reducing a splendid set of plums and crab apples, and totally destroying corn, cucumbers, beans and squash, together with many of the newly bedded annual flowers.

The remainder of the season was all that could be desired, and the comparatively long, open fall compensated for much of the damage done early in the season, and, as an instance of the wonderful rapidity of growth here, the cucumbers, squash, &c., that were destroyed by frost and resown as late as June 7, produced a large crop early in August, results equal to previous years when sown on May 10.

All tree seeds germinated well, and a feature of the season was the luxuriant growth made by both fruit and forest trees, some specimens of the native maple (*Acer negundo*) showing six feet of new wood.

APPLES, 1901.

TRANSCENDENT CRAB.

The two trees of this variety growing on the farm were covered with blossom, and a fine crop of fruit set. Unfortunately, the frost of June 6 completely destroyed it, and no fruit was harvested. A number of scions were taken from these trees during the autumn, which will be used as grafts on *Pyrus baccata* next spring.

PYRUS BACCATA.

There was a large set of a number of varieties of this crab apple, but the frost previously referred to seriously reduced the quantity, though fortunately, enough specimens remained uninjured to allow of a comparison of varieties.

The greater portion of these wild forms were very small, but the following were superior enough to warrant propagation :—

Pyrus baccata sanguinea.—Colour, rosy red, when ripe ; ripe August 20 ; depth, 1 inch ; flavour, fairly sweet, and not very astringent.

Pyrus baccata lutea.—Colour, a deep yellow ; ripe August 18 ; depth, $\frac{5}{8}$ inch ; inch ; flavour acid, but palatable.

Pyrus baccata prunifolia.—Colour, deep green, with slight rosy shade on sunny side ; depth, $\frac{7}{8}$ of an inch ; flavour palatable, but dry.

Pyrus baccata yellow.—Colour, light yellow ; ripe August 20 ; depth, $\frac{3}{4}$ of an inch ; flavour acid, but palatable.

The above varieties would make good preserves, and, as their hardiness is unquestionable, they deserve to be generally grown. It is intended to use those smaller fruiting varieties as stocks as fast as superior scions are available.

The following additional varieties of *Pyrus baccata* were received during the past season and planted in a new orchard on the hillside :—

Variety.	Number Received.	Number Alive Fall 1901.
Pyrus prunifolia A A 3548	4	2
" spectabilis floribunda Schendeckeri	4	4
" " A A 1615	4	4
" malus A A	8	7
" " pendula A A	6	4
" " A A 139—1	4	4
" latulæfolia	4	3
" malus orthocarpa A A 7424	4	4
" prunifolia fructucoccinea	4	4
" baccata oblonga A A	4	4
" prunifolia A A 139—2	12	8
" Sieboldii A A 1850	4	4
" baccata A A 2550	4	3
" " sanguinea A A	4	4
" " latekeeping variety	4	3
" " flava	4	4
" " variety A A	4	4
" " A A	4	3

CROSS-BRED APPLES.

The cross-bred apples commented upon on pages 368, 369 and 370 of last year's report made excellent progress during the past season. Many of the trees are now of a considerable size, and will blossom next year, when interesting results are anticipated. Out of a total of 117 trees which went into the winter of 1900-01, all came through in spring alive to tips, with the following exceptions :—

No. 1, Pyrus baccata x *Wealthy.*—Killed back slightly

No. 2, No 162.—Killed back one-quarter.

No. 3, No. 63.—Killed back one-half.

No. 4, Pyrus baccata x *Red Anis.*—Killed back slightly.

No. 5, Pyrus baccata x *Orange Crab.*—Killed back one-half.

The following additional cross-breds were received during the past season, a portion of which were used to complete the block already commenced, the balance being placed in a new orchard situated on the hillside, north of Superintendent's house. The appended notes show their progress during the summer.

Name.	Number Received.	Number Alive Fall 1901.	Name.	Number Received.	Number Alive Fall 1901.
Carleton	2	2	Hunter	4	4
No. 53	2	2	No. 19	1	1
No. 142	1	1	Pyrus baccata x Krimskoe	2	2
No. 198	1	Dead.	Pyrus baccata x Ball's Winter Crab	2	2
No. 192	2	1	Pyrus baccata x Pewaukee	2	2
No. 179	3	3	Seedlings of Progress	50	50
Eaton	3	3	" Novelty	48	46
No. 520	2	2	" Eaton	21	17
Cavan	1	1	" Dean	25	20
No. 165	2	2	" Eastman	31	27
No. 167	3	3	" Belmont	24	20
No 184	2	2	" Pioneer	50	50
No. 183	2	1	" Olive	5	4
Belmont	4	4	" Cavan	8	8
No. 196	3	3	" Aurora	67	59
No. 175	4	4	" Charles	32	32
No. (lost)	1	1	" Prairie Gem	49	36
No. 163	1	1	" Pauline	12	12
Aurora	1	1	" Hunter	6	5
No. 132	1	1			
Eastman	2	2			
Parker	1	1			

The above table shows a very successful planting. Out of a total of 483 trees planted, most of them very small, 440 went alive into winter quarters, or not quite 9 per cent of a loss. We have now a large stock of these cross-breds on the farm, and in a few years some most interesting results in apple culture may be expected, as, up to the present, they have proven quite hardy.

GRAFTED APPLES.

The following varieties of apples were root-grafted on stocks of *Pyrus baccata* in the spring of 1899, and came through the winter of 1899-1900 in good condition. Excellent growth was made during the past season, and their further progress will be watched with interest :—

Ostrakoff, grafted on Pyrus baccata from Stevenson.
Wealthy " " " "
Apple 27 years old, grafted on Pyrus baccata from Stevenson.
Hibernal " " " "
Anisette " " " "
Repka Malenka " " " "
Anisim " " " "
Standard Apple " " " "
Crab Apple " " " "

PLUMS.

Although the plum crop was not a heavy one on the farm this season, it was in many respects very satisfactory. The trees were covered with blossom in the spring, and an exceptionally heavy crop of fruit set, the greater portion of which, however, was destroyed by the frost on the evening of June 6. Fortunately, not many of the trees were entirely stripped. In many instances, they were closely planted and sheltered each other, and enough fruit escaped the frost to enable us to obtain information in regard to the comparative merits of the various varieties. This partial immunity was particularly opportune by reason of the fact that a large block, containing some hundreds of seedlings, had come into bearing for the first time this season, thus enabling us to obtain an amount of data which might have otherwise been considerably delayed.

This large plantation of seedlings was sent from the Central Experimental Farm, in the spring of 1897, where they had been grown from the seed of fruit ripened at Ottawa. As mentioned in my report for 1897, they consisted of seedlings of Cheney, Hungarian, Yosemite Yellow, Voronesh, Ida, Rollingston, Weaver, De Soto, Van Buren, Wolf, Yosemite Purple, Speer and Americana.

Some of the plums described in the following pages were from a consignment sent from Ottawa in the spring of 1893. These were seedlings of Weaver, De Soto and Cheney, grown from plums which had ripened at the Central Experimental Farm. In the spring of 1897, some of the trees from this earlier consignment of seedlings blossomed for the first time, but owing to a late spring frost, the fruit did not form.

My report for 1898 shows that during that season 11 Weaver seedlings, 1 Cheney seedling and 2 De Soto seedlings fruited, but although frost came later than the average season, the fruit was frozen before fully ripe. Twenty of the same lot of seedlings bore fruit in 1899, when the same unfortunate experience occurred. In 1900 they again blossomed well and set fruit freely, but the crop was destroyed by a late spring frost.

The success this year has been most encouraging, but while hopeful for the future of the plum crop in Manitoba, especially from early ripening sorts, it must be borne in mind that there has been no frost in August this year, which is unusual.

The plums which have ripened on the Brandon Experimental Farm this year have been much superior, both in size and flavour, to the fruit produced on trees of the type *Prunus nigra*, which is the wild plum of Manitoba.

The varieties mentioned as Frankland's seedlings were procured from Mr. Thos. Frankland, of Stonewall, Manitoba.

If these plums continue to fruit well and prove hardy, it is intended to propagate the best of them for further distribution and test.

Following will be found comparative notes on the best varieties which ripened.

Weaver Seedling No. 1.—Ripe September 10 ; colour deep red ; depth 1⅛ inches ; nearly round ; thin skin ; flavour very good.

Weaver Seedling No. 4.—Ripe September 16 ; colour greenish yellow, splashed and dotted with red ; depth 1⅜ inches ; slightly elongated ; thin skin ; flavour very fine—one of the best.

Weaver Seedling No. 5.—Ripe September 20 ; colour deep yellow, dotted with red ; depth 1 inch ; round ; skin fairly thin ; flavour good.

Weaver Seedling No. 6.—Ripe September 16 ; colour deep red ; depth 1⅛ inches ; round ; fairly thin skin ; flavour good.

Cheney Seedling No. 8.—Ripe September 12 ; colour bright yellow, splashed with red ; depth 1¼ inches ; slightly elongated and flattened ; thin skin ; flavour fine.

Weaver Seedling No. 9.—Ripe September 10 ; colour bright yellow, splashed with red ; depth 1¼ inches ; slightly elongated and flattened ; thin skin ; flavour excellent.

Weaver Seedling No. 11.—Ripe September 12 ; colour bright yellow, splashed with red ; depth 1⅛ inches ; slightly elongated ; thick skin ; flavour good.

Weaver Seedling No. 12.—Similar to No. 11 in colour and shape, but of better flavour, and ripened four days later.

Wolf Seedling No. 13.—Ripe September 10 ; colour yellow, heavily splashed with red ; depth 1⅛ inches ; thin skin ; flavour good.

Weaver Seedling No. 14.—Ripe September 24 ; colour greenish yellow, dotted with red ; depth 1¼ inches ; thin skin ; flavour good ; roundish.

Weaver Seedling No. 16.—Ripe September 16 ; colour deep yellow, slightly splashed with red ; depth 1⅛ inches ; nearly round ; thin skin ; flavour very good.

Weaver Seedling No. 18.—Ripe September 15 ; colour deep yellow, nearly covered with red splashes ; slightly elongated ; depth 1⅜ inches ; thin skin ; flavour very fine—a first-class variety.

Weaver Seedling No. 20.—Ripe September 16 ; colour deep yellow, splashed with red ; depth 1⅛ inches ; slightly conical ; thin skin ; flavour very good.

Weaver Seedling No. 21.—Ripe September 18 ; colour deep yellow, slightly dotted with red ; depth 1⅜ inches ; slightly elongated ; thin skin ; flavour very fine—a first-class variety.

Voronesh Seedling No. 22.—Ripe September 10 ; colour yellow, heavily splashed with red ; roundish ; depth 1¼ inches ; skin fairly thin ; flavour very good.

Weaver Seedling No. 23.—Colour bright yellow, slightly splashed with red ; ripe September 13 ; elongated ; depth 1¼ inches ; thin skin ; flavour very good.

Native Seedling, No. 26.—Ripe August 21 ; colour red ; roundish oval ; depth 1 inch ; thin skin ; fine flavour.

Frankland's Seedling No. 27.—Ripe August 25 ; colour yellow, suffused with red ; roundish oval ; depth 1 inch ; thin skin ; flavour pleasant.

Frankland's Seedling, No. 29.—Ripe August 30 ; colour yellow splashed and dotted with deep red ; depth 1 inch ; elongated ; thick skin ; flavour good.

Cheney Seedling No. 30.—Ripe August 30, colour yellow, dotted with red ; depth 1¼ inches ; roundish ; thick skin ; flavour good.

Voronesh Seedling, No. 31.—Ripe September 12 ; colour yellow, splashed and dotted all over with red ; depth 1 inch ; round ; skin fairly thin ; flavour very good—a fine variety.

Yosemite Seedling No. 32.—Ripe September 20 ; colour bright yellow, splashed with bright red ; round ; depth 1 inch ; skin thin ; flavour good.

Voronesh Seedling, No. 35.—Ripe September 16 ; colour yellow, dotted with red ; round ; depth 1 inch ; thick skin ; flavour very good.

Hungarian Seedling, No. 36.—Ripe September 12 ; colour yellow, heavily splashed with red ; depth 1⅛ inches ; slightly flattened ; thin skin ; flavour very good.

Seedling No. 37.—Ripe September 9 ; colour deep yellow, heavily splashed with red ; nearly round ; depth 1⅛ inches ; thin skin ; flavour very good.

Seedling No. 39.—Ripe September 19 ; colour deep yellow, heavily splashed with red ; depth 1⅛ inches ; roundish and slightly elongated ; thin skin ; flavour good.

Seedling No. 43.—Ripe September 20 ; colour deep yellow, slightly dotted with red ; depth 1 inch ; round ; thin skin ; flavour good.

Seedling No. 47.—Ripe September 16 ; colour deep yellow, heavily splashed with red ; depth 1 inch ; round ; thick skin ; flavour good.

Seedling No. 48.—Ripe September 15 ; colour deep yellow, heavily splashed with red ; depth 1¼ inches ; elongated and flattened ; thin skin ; flavour good.

Seedling No. 49.—Ripe September 15 ; colour deep yellow, splashed with red ; depth 1 inch ; nearly round ; thick skin ; good flavour.

Seedling No. 52.—Ripe September 16 ; colour deep yellow, dotted with red ; depth 1⅜ inches ; fairly thin skin ; flavour good.

Seedling No. 55.—Ripe September 16 ; colour deep yellow, slightly dotted with red ; thin skin ; flavour good ; nearly round.

Seedling No. 56.—Ripe September 16 ; depth 1¼ inches ; colour bright yellow, slightly dotted with red ; slightly flattened ; thick skin, flavour good.

Seedling No. 57.—Ripe September 16 ; depth 1 inch ; colour deep red ; conical ; thick skin ; flavour good.

Seedling No. 58.—Ripe September 17 ; colour bright yellow, slightly dotted with red ; depth 1 inch ; roundish ; thick skin ; flavour good.

Seedling No. 59.—Ripe September 15 ; colour bright yellow, heavily dotted with red ; depth 1⅛ inches ; conical ; thin skin ; flavour good.

Seedling No. 60.—Ripe September 17 ; colour yellow, heavily splashed with red ; depth 1⅛ inches ; thin skin ; flavour good.

Seedling No. 61.—Ripe September 15 ; colour yellow, heavily splashed with red; roundish; thin skin; flavour good.

Seedling No. 63.—Ripe September 16; colour deep yellow, nearly covered with red; depth 1⅜ inches; conical; fairly thin skin; flavour very good.

Seedling No. 65.—Ripe September 15; colour deep red; depth 1¼ inches; conical; thick skin; flavour good.

Seedling No. 66.—Ripe September 18; colour deep yellow, heavily dotted with red; depth 1 inch; conical; thin skin; flavour good.

Seedling No. 67.—Ripe Septemper 17; colour deep yellow, heavily dotted with red ; conical ; depth 1 inch ; think skin ; flavour good.

Seedling No. 71.—Ripe September 20; colour greenish yellow, dotted with red; depth 1½ inches; roundish; thin skin; flavour good—a fine variety.

Seedling No. 74.—Ripe September 28; colour deep red; depth 1 inch; round; thin skin; flavour good.

Seedling No. 75.—Ripe September 20; colour deep yellow, dotted with red; depth 1 inch; roundish; thin skin; flavour very good.

Seedling No. 76.—Ripe September 17 ; colour deep yellow, dotted with red ; depth 1⅛ inch; roundish; thin skin; flavour very good.

Seedling No. 77.—Ripe September 20; colour bright yellow, dotted with red; depth 1⅛ inches; slightly conical; thin skin; flavour good.

Seedling No. 80.—Ripe September 20 ; colour deep yellow, heavily splashed with red; depth 1⅛ inches; flattened and elongated; thin skin; flavour good.

Seedling No. 81.—Ripe September 23; colour deep yellow, heavily splashed and spotted with red; depth 1¼ inches; conical; flattened; thin skin; flavour good.

Seedling No. 82.—Ripe September 23; colour yellow nearly covered with red ; depth $1\frac{1}{16}$ inch; thin skin; flavour good; conical.

Seedling No. 83.—Ripe September 18; colour yellow, heavily splashed and dotted with red; depth 1¼ inches; elongated; thin skin; flavour very good.

Seedling No. 84.—Ripe September 8; colour bright red; depth, 1¼ inches; elongated; flavour good; thin skin.

Seedling No. 86.—Ripe September 10; colour yellow, heavily splashed with red; depth 1⅛ inches; elongated; thin skin; flavour very good.

Seven fair-sized trees of *Aiken* plum were received during the season from Mr. H. L. Patmore's nurseries, Brandon, and planted on the hillside. These are the only representatives growing on the farm of this variety, which has proven very satisfactory locally, and also at the Experimental Farm at Indian Head.

SAND CHERRIES.

There was a very fair crop of Sand Cherries harvested during the past season, which would have been exceptionally heavy had not the frost of June 6th seriously injured them.

Brandon, No. 6.—Ripe August 4 ; medium size ; dark red in colour, slightly astringent ; very prolific ; thin skin ; firm flesh ; fairly sweet.

Seven trees of 'Rupert' Cherry and one tree of 'Compass' Cherry, crosses between the Sand cherry and plum, were received from the Central Experimental Farm during the past season. All made excellent growth, which ripened well and went into winter quarters in good condition.

RASPBERRIES.

Owing to the unfavourable season of 1900, very little growth was made in raspberries, consequently the crop of 1901 was extremely light. The past year's growth, however, has been very vigorous and gives promise of a satisfactory crop next season. On the approach of winter, the canes were laid down and the tips covered with soil, in order to afford as much protection as possible.

CHERRIES.

A small quantity of seed of three varieties of cherries were received from Russia in the fall of 1900.

These were stratified for the winter and sown on April 25, 1901. The germination was good and a number of plants of each variety made excellent growth, and have gone into winter quarters in fine condition.

CURRANTS.

The currant crop of 1901 was only a very medium one. Although there was a good display of bloom, the setting was considerably interfered with by spring frosts, and only a comparatively small crop of fruit was harvested. Exceptionally fine growth, however, was made during the season, and hopes are entertained of better results in 1902.

Following will be found a few notes on the different varieties under cultivation here, which have fruited during the past season.

RED VARIETIES.

Red Grape.—A robust grower ; flavour fairly sweet ; size medium to large ; length of spike, 1¾ inches ; ripens evenly.

Raby Castle.—A robust grower ; fairly sweet ; size medium to large ; length of spike, 1⅞ inches ; ripens evenly.

Pomona.—A fairly vigorous grower ; size medium to large ; length of spike, 2 inches ; flavour sweet ; an even ripener.

Wilder.—Produced only a very few berries ; trees small.

North Star.—A robust grower ; size small to medium ; flavour fairly sweet ; length of spike, 2 inches ; even ripener.

Red Cherry.—Of weak growth ; a large berry ; sub-acid ; length of spike, 1¾ inches ; not productive.

Versailles.—A fairly vigorous grower ; size small to medium ; length of spike, 1¼ inches ; not fruitful ; very sweet.

Fay's Prolific.—Produced very little fruit ; plant weak ; flavour insipid ; berries very large.

Prince Albert.—A vigorous grower ; fruit small ; sweet ; length of spike, 1¼ inches; not fruitful.

Victoria.—A vigorous grower ; fruit medium ; slightly acid ; length of spike, 1⅞ inches ; ripens evenly ; fairly productive.

Fertile D'Angers.—This variety has spikes of medium length ; size large ; sweet ; a fairly vigorous grower.

WHITE VARIETIES.

White Grape.—Flavour good ; sweet ; length of spike, 1¾ inches ; berry small to medium ; a vigorous grower, but gave a poor crop.

White Dutch.—Vigorous grower ; fruit small to medium ; flavour very pleasant ; spike of medium length, somewhat thinly set.

BLACK VARIETIES.

Black Champion.—Killed to near ground, winter 1900-1901. Made fair growth 1901.

Lee's Prolific.—A robust grower ; thinly set ; flavour poor, sub-acid ; skin tough.

Victoria.—Plants weak and produced practically nothing.

Black Naples.—Plants in weak condition, and produced very little fruit.

Standard.—A vigorous grower ; skin thin ; flesh sweet and juicy ; berries large.

Monarch.—A vigorous grower ; berries of medium size ; skin thin ; spikes very thinly set ; flesh sweet and juicy.

Eclipse.—Skin rather tough, sub-acid ; medium sized berries thinly set ; a fairly vigorous grower.

Charmer.—Berry of medium size ; skin tough ; flavour fair, somewhat acid ; a vigorous grower ; thinly set.

Stewart.—Size medium to large ; skin tough ; of fair flavour, acid ; a vigorous grower ; thinly set.

Perry.—Berry small to medium ; skin tough ; of fair flavour, somewhat acid ; a vigorous grower ; thinly set.

Kerry.—Skin rather tough ; of fair flavour, acid ; a vigorous grower ; not very productive ; spikes thinly set.

Winona.—Berry of medium size ; skin thin ; flesh juicy and sweet ; a vigorous grower ; thinly set.

Clipper.—Berry small to medium ; skin fairly tender ; flesh slightly acid ; a vigorous grower ; fruit thinly set.

Beauty.—Berry medium to large ; thin skin ; flesh sweet and juicy ; fairly well set ; a vigorous grower.

Ontario.—Berry small to medium ; skin moderately thin ; flesh fairly sweet and juicy ; fairly well set ; a vigorous grower.

Eagle.—Berry medium to large ; skin thin ; flesh sweet and juicy ; a very vigorous grower ; thinly set.

RHUBARB.

There are now nineteen varieties of this useful vegetable growing at the Experimental Farm, most of them showing distinct characteristics in colour, habit of growth, yield, &c.

Owing to the comparatively trifling production of fruit in Manitoba and the high prices charged for the imported product, rhubarb occupies a prominent position in the Manitoba housekeeper's supply of preserves. Fortunately, rhubarb seems to be specially adapted to the Manitoba climate, and with even a moderate amount of cultivation will respond freely.

It is always desirable, if possible, to plant in considerable quantity, so that some of the roots may be available for spring forcing. These should be lifted just before freezing up, placed in barrels in the cellar and covered with sand. Water should then be given from time to time as required, and in a short time tender and juicy shoots will be produced, which, coming in mid-winter, are a very desirable addition to the table. The forced roots should be planted outside the following spring, and allowed one year to recuperate before pulling. The following descriptive notes were taken during the growing season, and to secure the weights an average plant of each variety was stripped on June 27.

Early Scarlet.—A fairly vigorous grower ; colour bright cherry red throughout ; deeply ribbed on under side of stalk ; very tender and juicy ; average length of stalk, 18 inches ; weight from one plant, 13 pounds.

Early Prince.—A fairly vigorous grower ; colour green, heavily mottled with light red ; slightly ribbed on under side ; very tender and juicy ; average length of stalk, 22 inches ; weight from one plant, 24 pounds.

Sangster's Prince of Wales.—A very vigorous grower ; colour brilliant red throughout, no green ; stalk slightly indented on upper side and ribbed on under side ; very tender and juicy ; average length of stalk is 22 inches ; weight from one plant, 20 pounds. A very fine variety.

Tobolsk.—A vigorous grower ; colour a mottled red ; slightly ribbed on under side ; deeper colour than No. 2 ; very tender ; upper side nearly flat ; average length of stalk, 22 inches ; weight from one plant, 25 pounds.

Paragon.—A fairly vigorous grower, of a mottled deep red colour ; ribs on under side well defined, and deep indentation on upper side ; only fairly tender ; average length of stalk, 16 inches ; weight from one plant, 10½ pounds.

Prince Albert.—A vigorous grower ; heavily mottled with deep red ; slightly ribbed on under side ; nearly flat on upper side ; very tender and juicy ; average length of stalk, 24 inches ; weight from one plant, 31½ pounds.

Magnum Bonum.—A vigorous grower ; of a light red mottled colour ; slightly ribbed on under side ; nearly flat on upper ; similar in appearance to No. 6, though not so deep in colour ; very tender and juicy ; average length of stalk, 20 inches ; weight from one plant, 27 pounds.

Brabant's Colossal.—A very vigorous grower ; of a light red mottled colour ; nearly smooth on under side ; upper side nearly flat ; tender and juicy ; average length of stalk, 26 inches ; weight from one plant, 30 pounds.

Early Crimson.—An extremely vigorous grower ; lower half stalk mottled with light red, upper half greenish ; heavily ribbed on under side, upper side indented ; tender ; average length of stalk, 26 inches ; average weight from one plant, 30½ pounds.

Scarlet Nonpareil.—A very vigorous grower ; colour mottled with red ; moderately ribbed on under side ; well marked indentations on the upper side ; tender and juicy ; average length of stalk, 26 inches ; average weight from one plant, 26 pounds.

General Taylor.—A moderate and very even grower, with very little variation in size of stalk ; colour green throughout, sparsely mottled with very deep red ; tender and juicy ; heavily ribbed on under side, indented on upper ; average length of stalk, 14 inches ; average weight of one plant, 16½ pounds.

Marshall's Royal Linnæus.—A vigorous grower ; colour mottled with light red ; slightly ribbed on under side, nearly flat on upper side ; very tender ; average length of stalk, 16 inches ; average weight of one plant, 26 pounds.

Giant.—A vigorous grower ; colour heavily mottled with light red ; under side ribbed ; upper side nearly flat ; very tender and juicy ; average length of stalk, 18 inches ; average weight from one plant, 19 pounds.

Excelsior.—Planted fall of 1900 ; not yet advanced enough to report on.

Royal Albert.—A somewhat weak grower ; stalks numerous but thin ; colour at base very bright red, shading to green, mottled with red. Only very slightly ribbed on upper side, tender. Average length of stalk, 14 inches. Average weight from one plant, 22½ pounds.

Queen.—Planted fall 1900, and not sufficiently advanced to report on.

Strawberry.—A very vigorous grower ; colour mottled with light red ; slightly ribbed on under side, nearly flat on upper side. Average length of stalk, 20 inches. Average weight from one plant, 31½ pounds.

Tottle's Improved.—An extremely vigorous grower ; individual stalks very large ; deeply indented on upper side and distinctly ribbed on lower ; somewhat stringy ; colour greenish ; slightly mottled with light red. Average length of stalk, 20 inches ; average weight from one plant, 31½ pounds.

Victoria.—A vigorous grower ; colour lower half deep red, shading to a mottled red towards leaf. Indented on upper side and distinctly ribbed on lower ; tender and juicy. Average length of stalk, 14 inches ; average weight from one plant 17 pounds.

ARBORETUM.

No additions were made to the Arboretum during the past season. A portion of the hillside to the north consisting of a poor gravelly ridge was planted with green ash, which made fair growth, nearly all the trees planted surviving. As the larger part of the Arboretum is now covered with grass, it is rendered more attractive, and the large collection of varieties included is much appreciated by visitors. The growth in some portions has been so luxuriant that a considerable number of trees have had to be removed to make room for the more meritorious varieties which were being crowded. A gratifying feature in connection with this is that many varieties which were classed as tender a few years ago, are now proving much hardier on account of the shelter they enjoy.

ADDITIONS TO ARBORETUM IN 1900.

The following notes on trees added to the Arboretum during 1900 show their condition after one winter's trial.

Scotch Yellow Rose.—Wintered well ; strong growth, 1901.

Populus nigra.—Wintered well ; strong growth, 1901.

Juniperus sabina erecta.—Wintered well ; strong growth, 1901.

Picea excelsa.—Wintered well ; strong growth, 1901.

Lonicera tatarica grandiflora.—Wintered well, strong growth, 1901.

Amber Currant.—Wintered well ; strong growth, 1901.

Rosa acicularis.—Wintered well ; strong growth, 1901.

Carpinus caroliniana.—Wintered well ; strong growth, 1901.

Fraxinus nigra.—Killed back one-half ; weak growth, 1901.

Japanese Oak.—Killed back one-half ; weak growth, 1901.

Rosa alpina.—Wintered well ; strong growth, 1901.

Rhus aromatica.—Killed back three-quarters ; strong growth, 1901.

Thuya occidentalis Elwangeriana.—Wintered well ; strong growth, 1901.

Ribes aureum tenuifolium.—Wintered well ; strong growth, 1901.

Rhamnus davurica.—Killed back one-quarter ; strong growth, 1901.

Rosa cinnamonea sibirica.—Wintered well ; strong growth, 1901.

Thuya occidentalis variegata.—Wintered well ; fair growth, 1901.

Rhamnus catharticus.—Killed back one-half ; strong growth, 1901.

Spiraea sorbifolia.—Killed back one-quarter ; strong growth, 1901.

Ribes alpinum sterile.—Wintered well ; strong growth, 1901.

Betula alba fastigiata.—Wintered well ; fair growth, 1901.

Gymnocladus canadensis.—Wintered well ; strong growth, 1901.

Photinia variabilis.—Dead ; winter killed.

Cotoneaster acutifolia.—Wintered well ; strong growth, 1901.

Berberis vulgaris foliis purpureis.—Killed back one-half ; fair growth, 1901.

Acer Saccharinum, No. 1, from Minnesota Seed.—Killed back one quarter ; fair growth, 1901.

Acer saccharinum, No. 2, from Minnesota Seed.—Killed back one-quarter ; fair growth, 1901.

Cytisus nigricans.—Killed back one half ; strong growth and flowered, 1901.

Celastrus articulatus.—Killed back three-quarters ; weak growth, 1901.

Rhus glabra.—Dead ; winter killed.

Salix candida femina.—Wintered well ; strong growth, 1901.

FLOWERING SHRUBS.

There are now a very large number of flowering shrubs growing on the Experimental Farm, many of which are very beautiful, and they elicit much admiration from visitors who are fortunate enough to visit the farm during their flowering period. The following were specially noted during the past season :—

Syringa vulgaris (*Common Lilac*).—Commenced to flower on May 19. These were exceptionally fine during the past season, as many as two hundred spikes being counted on some bushes. This is one of our most desirable shrubs, and is quite hardy.

Crataegus coccinea.—This beautiful hawthorn, though a native shrub, is well worthy of extensive cultivation. It commenced to flower on May 17, and continued until the end of the month, during which time it was a dazzling mass of white.

Viburnum lantana (*Wayfaring tree*).—Commenced to flower on May 21. Its pretty white trusses, borne in profusion, make it desirable in a collection of flowering shrubs. Thoroughly hardy.

Lonicera tatarica (*Tartarian Honeysuckle*).—This beautiful honeysuckle is one of our most desirable flowering shrubs. It commenced to bloom on May 22, and continued in flower for nearly a month, being literally covered with blossoms during that period. It is quite hardy, and succeeds in almost any location.

Caragana Redouski (*Siberian Pea*).—This variety of caragana is much more floriferous than *Caragana arborescens*, and of a dwarf habit. It is a mass of yellow when in full bloom, and is quite a resort for bees. Commenced to flower on May 18. Thoroughly hardy.

Prunus pumila (*Sand Cherry*).—A very early blooming and strong growing shrub; commencing to bloom early in May, it furnishes a mass of white flowers which are very acceptable at that season. It is quite hardy.

Caragana frutescens pendula.—This is one of the most beautiful of the caraganas; its charming pendulous habit, coupled with its free blooming propensities, makes it a most desirable acquisition to a collection of ornamental shrubs. It commenced to flower May 18. Quite hardy.

Spiraea hypericifolia.—A dwarf flowering shrub of compact habit, producing large masses of pure white flowers, early in the season. Hardy.

Syringa vulgaris, Charles X.—This is the best variety of Lilac as yet grown at the Farm ; the spikes are very large and full, of a much deeper colour than *Syringa vulgaris*, and it is very free flowering.

Pyrus Americana (*Mountain Ash*).—The western form of this species is quite hardy here, and its large trusses of white flowers in late spring, followed by its brilliant red berries in autumn, combine to make it one of our most beautiful flowering shrubs.

Viburnum opulus sterilis (*Snowball*).—This is the sterile form of the High Bush Cranberry (Viburnum opulus). Its large ball-like trusses of beautiful white flowers, which are borne very abundantly, make it a most desirable ornamental shrub ; quite hardy.

Cytisus purpureus.—This began to flower May 22. A dwarf and very floriferous species. The pea-shaped flowers are of a bright purple colour and are borne in profusion.

Genista tinctoria (*Greenweed*).—A very free flowering dwarf ornamental shrub. Its yellow pea-shaped flowers literally cover the plant and present a dazzling mass of colour ; hardy.

Pyrus malus.—Though not thoroughly hardy, this shrub will produce flowers here and is well worthy of a trial. The blossoms are of a fair size and of a bright brick red colour, making a very attractive specimen.

HEDGES.

The large hedges consisting of Native Spruce (*Picea alba*), Native Maple (*Acer negundo*), Siberian Pea Tree (*Caragana arborescens*), Native Ash (*Fraxinus pennsylvanica lanceolata*), made excellent growth during the season. No additions were made to our sample hedges, a number of which suffered considerably from the effects of the snowstorm, previously referred to, as did also the large Caragana hedge, planted in 1883. By careful pruning, however, nearly all traces of the damage have been obliterated and no permanent injury is anticipated.

Following will be found some notes on these hedges, taken during the season :—

Pyrus baccata aurantiaca (*Berried Crab of Siberia*).—A promising hedge, but somewhat thin.

Lonicera tatarica elegans (*Bush Honeysuckle*).—A very promising medium sized hedge.

Caragana mollis glabra.—Promising but not so compact as *Caragana arborescens.*

Artemisia abrotanum (*English Southernwood*).—A very symmetrical dwarf hedge.

Shepherdia argentea (*Buffalo Berry*).—An ornamental dwarf hedge.

Rosa rugosa.—A low growing hedge, ornamental when in flower but suckers badly.

Celtis occidentalis (*Hackberry*).—Does not promise to be a desirable hedge ; not thoroughly hardy and rather sensitive to spring frosts.

Ligustrum amurense (*Amur Privet*).—Not thoroughly hardy, but a very symmetrical dwarf hedge.

Spiraea Douglasii (*Douglas's Spirea*).—Rather unpromising as a hedge, not thoroughly hardy.

Syringa Josikea (*Hungarian Lilac*).—Very symmetrical and ornamental.

Crataegus Coccinea (*Native Hawthorn*).—A very slow growing and somewhat thin hedge.

Lonicera albertii (*Albert's Honeysuckle*).—An ornamental hedge, but needs trellising to keep it in shape.

Fraxinus pennyslvanica lanceolata (*Native Green Ash*).—Not a promising hedge ; thin and rather susceptible to spring frosts.

Prunus Americana (*Native Plum*).—Promising ; a fairly compact hedge.

Acer ginnala (*Asiatic Maple*).—A most ornamental dwarf hedge ; very compact.

Rhamnus frangula (*Breaking Buckthorn*).—Makes a compact hedge.

Caragana grandiflora (*Large Flowering Pea Tree*).—A good medium hedge ; badly bent down by snowstorm.

Salix Britzensis (*Willow*).—A promising looking hedge.

Thuya occidentalis (*Western Arbor-vitæ*).—Makes a small and slow growing hedge.

Artemisia Abrotanum tobolskianum (*Rusian Southernwood*).—Not a desirable hedge.

Populus deltoidea (*Cottonwood*).—This free growing hedge has died from a severe attack of the yellow poplar rust which causes the leaves to wither and drop.

Larix pendula (*American Larch*).—Gives promise of making a good deciduous hedge.

Salix Laurifolia (*Laurel-leaved Willow*).—One-half killed out.

Salix Voronesh (*Voronesh Willow*).—Not healthy, killed back somewhat.

Rosa rubrifolia (*Red-leaved Rose*).—Killed back one-half ; not a desirable shrub here for hedge purposes.

Cotoneaster vulgaris (*Common Cotoneaster*).—Apparently of rather too spreading a habit to make a satisfactory hedge.

Lonicerea Tatarica elegans (*Elegant Tartarian Honeysuckle*).—Symmetrical and ornamental.

Salix laurifolia (*true*) *True Laurel-leaved Willow*).—Not healthy.

Ribes aureum (*Yellow Flowering Currant*).—A very pretty hedge.

Neillia opulifolia aurea (*Golden-leaved Ninebark*).—A very ornamental dwarf hedge.

Neillia opulifolia (*Ninebark*).—Very handsome and compact.

Populus tremuloides (*Tremulous Poplar or Aspen*).—A somewhat thin hedge.

Prunus pennsylvanica (*Native Pin Cherry*).—A symmetrical and compact hedge.

Corylus americana (*Native Hazel Nut*).—Not a promising hedge.

Amelanchier alnifolia (*Native Saskatoon*).—Ornamental but thin.

Rosa Sayi (*Native Wild Rose*).—An ornamental hedge, but its propensity to sucker makes its value questionable.

Spiraea salicifolia (*Native Meadow Sweet*).—A fine dwarf ornamental hedge,

Symphoricarpus occidentalis (*Native Snow-Berry*).—A very symmetrical hedge, but was badly bent down by snowstorm.

Elæagnus argentea (*Wolf Willow*).—Ornamental but somewhat thin.

Cornus stolonifera (*Native Dogwood*).—A compact and symmetrical hedge.

Syringa vulgaris (*Common Lilac*).—A good ornamental hedge.

AVENUES.

On account of the storm previously referred to, a vigorous pruning was necessitated on the Maple Avenue (*Acer negundo*) during the summer, and at the close of the season very few traces of damage were discernible.

The avenue composed of Native spruce (*Picea alba*) alternated with Native Maple, is a very attractive feature on the Farm. Many of the Spruce trees are now twenty feet high, and a considerable amount of seed was gathered from them during the autumn.

SHRUBS AND TREES RECEIVED DURING 1901.

A considerable number of trees representing one hundred and fourteen varieties were received from the Central Experimental Farm during the past year, and were planted in one of the Hedge Plots. Some of these, including some received from France, succumbed shortly after being planted, being in an advanced condition on arrival. All the varieties were, however, represented in the fall, and as many interesting species are included, it is hoped that they will winter successfully.

Perhaps one of the most interesting portions of the consignment was a collection of twenty distinct varieties of Lilac, which will be a most welcome addition to our stock of this very popular flowering shrub.

THE VEGETABLE GARDEN.

The past season was in most respects a decidedly favourable one for vegetables. The soil was in good condition for germination in the spring, and with the exception of a few weeks of dry weather immediately succeeding this, the season was all that could be desired. Nearly all varieties tested were up to and even above the average, and notwithstanding a sharp frost on the evening of June 6, very little material damage was noticeable. The results were very satisfactory.

ONIONS.

The onion crop was one of the most satisfactory recorded at the farm for some years. Nine varieties were sown on April 10, with Planet Junior hand drill, in rows eighteen inches apart. The seed germinated readily, the growth was vigorous all through the season, and all varieties ripened well. The yield was above the average. There was a very small percentage of 'thick necks,' and no traces of disease were manifest. The 'sets' were quite satisfactory with the exception of 'English Multipliers,' which were not as vigorous as usual. In the following table they are arranged in the order of their productiveness :—

Variety.	Date Sown.	Date Ripe.	Colour.	Shape.	Per cent of Thick Necks.	Average Weight of Bulbs.	Yield per Acre.
						Ozs.	Bush. Lbs.
Yellow Globe Danvers	April 10	Sept. 3	Light yellow	Globular	0	6	556 36
Trebon's Yellow	" 10	" 7	"	"	0	5	538 27
White Spanish Straw Coloured	" 10	" 12	Dark yellow	Flattish	15	5½	459 48
Blood Red	" 10	" 6	Dark red	"	0	6	453 45
White Dutch Hard Round	" 10	" 6	White	"	9	4⅗	423 30
Red Wethersfield	" 10	" 6	Dark red	"	3	7½	423 30
Market Favorite Keeping	" 10	" 6	Dark yellow	Flat	5	5	405 21
Paris Silver Skin	" 10	" 3	White	"	2	4½	363 ..
James' Keeping	" 10	" 3	Dark yellow	Globular	4	4	326 42
ONION SETS.							
Shallots	April 10	July 25	Brown	Clusters	0	1	170 40
English Multipliers	" 10	" 20	Dark yellow	"	0	2½	195 33
Yellow Dutch Sets	" 10	" 30	Light yellow	Globular	0	8	586 34

LETTUCE.

Nineteen varieties of lettuce were sown on April 10, with Planet Junior hand drill, in rows sixteen inches apart. On account of the moist condition of the soil, the germination was prompt, and all the varieties were well represented. For some time

after germination there was a period of dry, hot weather, which materially affected their progress, and which may account for the fact that a considerable percentage went to seed before forming heads. All varieties ripened seed, which was collected for future use.

The results of the test are given below in the order of their productiveness :—

Name of Variety.	Date Sown.	Date Headed out.	Variety.	Colour.	Average Weight.	Flavour and Texture.	Commenced to Seed.
					Oz.		
White Paris Cos...	April 10	July 8	Cos.....	Light green...	18	Fine flavor, firm heart	July 20
Trianon.....	" 10	" 8	"	Dark green....	16	" ..	" 18
Neapolitan.....	" 10	" 5	Curled cabbage	"	17	" ..	" 14
Blond Stonehead..	" 10	" 1	" ..	Light yellow..	16	" ..	" 10
Early Ohio.....	" 10	" 1	" ..	" ..	14	" ..	" 20
Marvel or Red Besson	" 10	" 10	" ..	Red edged, dk. yellow.....	12	Bitter soft heart	" 18
Troeadero Red-edged	" 10	" 5	" ..	Light green, red edged...	10	Fair flavor, firm heart	" 12
All Year Round, black seeded.....	" 10	" 5	Smooth cab'ge	Dark yellow ..	10	Sweet, fairly firm head	" 12
White Marvel of Cazard.....	" 10	" 7	Curled cabbage	Light yellow..	10	Bitter, fairly firm head	" 15
Brown Stone Head.	" 10	" 3	" ..	Light yellow, red edged...	9	Soft head, slightly bitter.	
All Year Round, white seeded.....	" 10	" 5	Smooth cab'ge	Light yellow..	8	Sweet flavour, firm heart.....	" 19
Wheeler's Tom Thumb.....	" 10	" 1	Curled cabbage	Dark green ...	5	" ..	" 19

The following varieties included in this list went to seed before heading out :—White Tennis Ball, Hardy Red Winter, Red Edged Victoria, Algiers, Hammersmith, Green Paris Cos, Forcing Milly.

CABBAGE.

Nine varieties of cabbage were sown in cold frame on April 26, and thinned to three inches apart as soon as they could be handled. They were planted outside on June 6, and as the weather at that period was particularly favourable, nearly all the plants survived.

In the following table they are arranged in the order of their earliness :—

Variety.	Date Sown.	Date Set Out.	Per Cent Headed.	Shape.	Average Weight.	Texture.
					Lbs.	
Paris Market Very Early.....	April 25..	June 6..	98	Conical...	7	Firm.
Extra Early Express	" 25..	" 6..	97	" ...	6	Somewhat loose.
Flat Parisian.....	" 25..	" 6..	100	Flat..	13	Very firm.
Winningstadt..	" 25..	" 6..	97	Pointed ..	8	"
St. John's Day—Early Drumhead... ..	" 25..	" 6..	94	Flat.. .	8	Firm.
Savoy Green Globe.....	" 25..	" 6..	98	Roundish.	7½	Somewhat loose.
Red Polish Short Stem.....	" 25..	" 6..	87	" .	6	Firm.
Red Large Drumhead	" 25..	" 6..	94	Flat..	8	"
Brussels Sprouts.....	" 25..	" 6..	.....	Did not mature sprouts.		

CAULIFLOWER.

Seven varieties of cauliflower were sown on April 25 in cold frames, and all germinated well. Transplanting commenced on June 6, and the weather being specially favourable, nearly all the plants survived, as in the case of the cabbage. A noticeable peculiarity of this vegetable during the past season was its late maturing, this being the case generally throughout the province, the late varieties not heading out before frost, and even the earlier ones being much later than usual.

Following will be found the results arranged in tabular form in order of earliness :—

Variety.	Date Sown.	Date Set Out.	Per Cent Headed.	Colour.	Texture.	Average Weight.
						Lbs.
Early Snowball	April 25	June 6	84	White	Firm and close	6
Extra Early Paris	" 25	" 6	85	Yellow	Somewhat open	4½
Extra Early Selected Dwarf Erfurt	" 25	" 6	75	White	Close	7¼
Early Paris Nonpareil	" 25	" 6	78	"	"	6
Large Algiers	" 25	" 6	None.			
Chambourcy Mammoth	" 25	" 6	"			

PEASE.

Only three varieties of garden pease were tested during the past season. These were sown outside on May 7, in double rows (three feet apart between the double rows). The germination was very poor, and only a small quantity of plants resulted. On examination being made of the small quantity of seed left over from sowing, the fact became apparent that a large proportion of the peas were affected by Pea Weevil. As this is becoming somewhat common of late years, it would seem to point out the advisability of using Manitoba home-grown seed, which is usually a bright, clean sample.

Variety.	Date Sown.	Date Ready.	Length of Pod.	Number of Pease.	Length of Vine.	Flavour.
			Ins.		Ins.	
American Wonder	May 7	July 6	2½	5—6	10	Very sweet.
Nott's Excelsior	" 7	" 7	2⅝	5—6	9	"
Heroine	" 7	" 20	4 1/16	9—10	28	Very fine.

RADISH.

Eleven varieties of radish were sown on May 7, with Planet Junior hand drill, in rows twelve inches apart. The germination of varieties was good, and as we were favored with moist weather during the period of root formation, the flavour and texture was far above the average. All were good, with the exception of Very Early Yellow Turnip and Early White Turnip, which were both somewhat deficient in flavour.

Variety.	Date Sown.	Colour.	Shape.	Flavour.
Forcing Turnip, Extra Early Dwarf	May 7	Red	Turnip	Very good.
Forcing Turnip, Scarlet	" 7	"	"	Fair.
Early Scarlet	" 7	"	Round	Very good.
Early Dwarf Scarlet Olive shaped	" 7	"	Olive	Excellent.
Forcing Scarlet White Tip Turnip	" 7	Red, white t'pd	Turnip	Very good.
Olive-shaped Scarlet	" 7	Red	Olive	Fair.
White Short Leaf Forcing, Olive-shaped	" 7	White	"	Very good.
Scarlet White Tipped Turnip	" 7	Red	Round	"
Early White Small Turnip	" 7	White	"	Fair.
French Breakfast	" 7	Red	Half long	"
Very Early Yellow Turnip	" 7	L. yellow	Turnip	Poor.

CUCUMBERS.

Cucumbers were again an excellent crop. Although the frost on the evening of June 6 completely destroyed the first sowing, the second sowing on June 7 made such rapid progress that they were very little behind average years in point of maturity. Four varieties were sown in the open, in hills 5 feet apart each way, and the germination was good in all instances.

The results are given in order of earliness :—

Variety.	Date Sown.	Date Ready.	Length.	Diameter.	Productiveness.	Average Weight.	Colour.	Shape.
			In.	In.		Oz.		
Early Cluster	June 7	Aug. 12	7	2½	Very productive	10	White	Straight.
Paris Pickling	" 7	" 12	9	2¼	"	7	Green	Twisted.
White Wonder	" 7	" 12	7	2½	"	10	White	Straight.
Evergreen White Spine	" 7	" 12	8	3	"	8	Green	"

PUMPKINS.

Two varieties of pumpkins were sown in the open on May 21, in hills 10 feet apart, This sowing was destroyed on June 6 by frost, and resown on June 7. A good crop was harvested from the late sowing.

Variety.	Date Sown.	Date Ready.	Colour of Skin.	Colour of Flesh.	Average Weight.	Productiveness.	Flavour.
					Lbs.		
Connecticut Field	June 7	Aug. 20	Yellow.	Yellow.	20	Very productive	Fair.
Japanese Pie	" 7	" 25	"	"	13	Fairly "	Excellent.

SQUASH.

Three varieties of squash were sown the past season on May 21, in the open, in hills ten feet apart. The first sowing was destroyed by frost on the evening of June 6, and was resown on June 7. The late sowing produced a very satisfactory crop, in all respects, and two varieties ripened.

Variety.	Date Sown.	Date Ready.	Colour of Flesh.	Colour of Skin.	Average Weight.	Ripened.
					Lbs.	
Long White Bush Marrow	June 7	Aug. 14	White	White	10	Seed ripened.
English Vegetable Marrow	" 7	" 14	"	"	8	"
Hubbard	" 7	" 14	Yellow	D. green	12	Green.

The White Bush Marrow seems to be the most desirable variety for Manitoba.

CARROTS.

Four varieties of carrots were sown on May 7, with Planet Junior hand drill, in rows eighteen inches apart. The crop was by far the most satisfactory of any recorded here for years, the roots being remarkably smooth and of good size. The long varieties again proved their inferiority, the yield being small, and necessitating much labour in pulling.

Variety.	Shape.	Colour.	Flavour and Texture.	Date Lifted.	Average Weight.	Yield per acre.	
					Lbs.	Bush.	Lbs.
Luc Half Long, Scarlet	Half long	Red	Very good	Sept. 28	1¼	671	51
Parisian Forcing, Red	S. stump rooted.	"	"	" 28	9	484	..
French Horn	"	l. red	Fair	" 28	1½	443	40
Long Blood Red	Very long	"	Good	" 28	8	265	

BEETS.

Five varieties of beets were sown with Planet Junior hand drill, in rows thirty inches apart, on May 17. The germination was good in all cases, the product being well up to the average in quality. The long varieties were (as usual) superior in colour and texture.

Variety.	Date Sown.	Date Ripe.	Colour.	Average Weight.	Flavour and Texture.	Shape.	Yield per Acre.	
				Lbs.			Bush.	Lbs.
Long Smooth Deep Blood Red	May 17	Sept. 28	Deep red narrow rings.	6½	Very fine.	Very long.	773	23
Early Blood Red Turnip	" 17	" 28	Wider rings, considerable white	4¼	Fair	Turnip	655	36
Black Queen	" 17	" 28	Deep red wide rings	2½	Very fine.	Long	382	48
Egyptian	" 17	" 28	Wide rings, very white	1½	Coarse	Flat	268	24
Dell's Black Leaf	" 17	" 28	Deep red narrow rings.	6½	Very fine.	Very long.	110	..

SWEET HERBS.

Three varieties of sweet herbs were sown on May 7, with Planet Junior hand drill, in rows eighteen inches apart, sage, savory and thyme, the latter failed, however, to germinate, a common occurrence with this herb. The others grew with their usual luxuriance.

SALSIFY.

This vegetable was as usual below the average ; the roots being very small and rough.

BEANS.

Six varieties of French beans were sown outside on May 21, in rows thirty inches apart, viz.: Fame of Vitry, Emperor of Russia, Dwarf Extra Early Edible Podded, Bagneolet Dwarf Black Speckled, Canadian Wonder, Flageolet Scarlet wax. All germinated well but were completely destroyed by the frost on the evening of June 6, 1901. A resowing was made on June 7, but owing to all the seed having been used for the first sowing, a substitution of varieties had to be made, procured from a local seedsman.

Variety.	Date sown.	Date ready.	Colour.	Length of pod.	No. of Beans.	Flavour and texture.	Productiveness.
Golden Wax	June 11	Aug. 17	Yellow.	6	3—4	Very tender.	V. productive.
Early China	" 11	" 18	" .	5	3—4	" ..	Fairly "
Flageolet Scarlet Wax	" 11	" 20	" .	6	4—5	" ..	Very "
Mammoth Red German Wax	" 11	" 30	" .	7	4—5	" ..	" "

TURNIPS.

Garden turnips were a much more satisfactory crop this season than for several years past. Their quality for table use being better than usual, doubtless on account of the moist season. Three varieties were sown with Planet Junior hand drill, on May 21, in rows thirty inches apart, and the following results were obtained :—

Variety.	Date sown.	Date ready.	Colour.	Shape.	Flavour
Early White Strap Leaved American Stone	May 21	July 15	White..	Long.....	Good...
Early Stone or Stubble Green Top	" 21	" 17	" .	Round....	" ...
Half Long Early White Vertus	" 21	" 20	" ..	Half long	Fair....

TOMATOES.

The comparatively open fall of the past season was very favourable to tomatoes, and a moderate quantity of ripe fruit was harvested. Two varieties were sown in hot-bed on April 25 and transferred to the open on June 14, nearly all the plants surviving. Dwarf Champion produced the first ripe fruit, but before frost Earliest of All proved the most productive.

Variety.	Date sown.	Date ripe.	Ripe fruit.	Green fruit.	Total.	Shape.	Flavour.
			Lbs.	Lbs.	Lbs.		
Earliest of All	April 25	Aug. 30	25	17	42	Somewhat ribbed.	Good.
Dwarf Champion	" 25	" 24	18	12	30	Smooth	Very good.

INDIAN CORN.

Three varieties of Indian corn were sown on May 21, in hills three feet apart by two feet, with Planet Junior hill dropping drill. Through severely cut by the frost on June 6, the majority of the plants survived, though the check made them somewhat late. None of the varieties ripened seed.

Variety.	Date sown.	Date ready.	Length of cob.	Variety.	Weight per dozen.	Flavour.
					Lbs.	
Cory	May 21..	Aug. 15..	7	10-rowed dent...	4¾	Excellent.
Mitchell's Extra Early	" 21..	" 20..	8	8-rowed flint ...	4	Fair.
First of All	" 21..	" 20..	6¾	10-rowed flint...	4½	Excellent.

ASPARAGUS.

The asparagus crop was particularly satisfactory during the past season. Commencing to shoot on May 6, it continued uninterruptedly for two months, its luxurious shoots being produced in profusion. All varieties did well—Barr's Mammoth being somewhat the largest yielder. Four varieties were grown, namely : Conovor's Colossal, Columbus Mammoth White, Barr's Mammoth and Giant Argenteuil.

CITRONS.

This vegetable, which is in much demand in Manitoba for preserving, gave an enormous yield during the past year. One variety was sown, viz. : Preserving, and from one row, 96 feet long, 473 pounds were gathered. Taking into consideration the fact that the first sowing was frozen out on June 6, the yield was a remarkable one.

PARSNIPS.

The parsnip crop was decidedly above the average this season, only one variety 'Hollow Crown,' was sown, with Planet Junior hand drill, in rows thirty inches apart, on April 10. The crop was harvested on October 12, and was of excellent quality, the yield being 755⅓ bushels per acre, calculated from the product of two rows, each 66 feet long.

SPINACH.

One variety, namely, 'Long Standing,' was sown on April 10, in rows eighteen inches apart. The product was of fine flavour and remained in condition for table for a comparatively long period. This vegetable comes in very opportunely in the early part of the season, when vegetables are somewhat scarce.

PARSLEY.

One variety, 'Extra Curl,' was sown on April 10, and gave, as usual, an excellent crop. A number of complaints are received here annually with reference to its non-success generally, but in nearly every instance late sowing was the cause of the trouble. To obtain the best results with parsley the sowing should be done as early as possible in the spring.

THE FLOWER GARDEN.

The flower garden was very satisfactory, and a continuous mass of bloom throughout the season. The weather during the early spring months, was favourable for hot-bed work, and a very fine stock of bedding plants were ready for transplanting to the open at the end of May. The first sowing was made on April 2, and concluded on the 25th, transplanting being brought to a conclusion on May 10. Bedding out commenced on June 3, and was well under way, when we were visited by the cool wave on June 5 and 6, previously referred to, and which caused much damage in this department. Many of the newly bedded annual flowers were frozen, and necessitated a replanting, which fortunately we were able to accomplish by reason of having surplus stock reserved for contingencies. Zinnias and Dahlias were the most seriously injured, and were cut to the ground, while all varieties were more or less affected. On the return of fine weather, however, many of the plants recovered, and very soon all trace of the damage was obliterated ; and the long open fall compensated in a great measure for the check sustained at this period. The Herbaceous perennials were much admired, and the number of varieties of this class now growing here constitute a very comprehensive collection.

Variety.	How Sown.	Date Sown.	Date Transplanted.	Flowering Period.
Asters (10 types)	Boxes, hotbed.	April 8..	June 3 to June 15.	July 5 to frost.
Amarantus superbus	" "	" 8..	" " ..	Ornamental leaved.
" bicolor	" "	" 8..	" " ..	" "
Ageratum Mexicanum	" "	" 8..	" " ..	July 3 to frost.
Antirrhinum majus	" "	" 8..	" " ..	June 30 to severe frost.
" " nanum	" "	" 8..	" " ..	" "
Abronia umbellata	Outside	May 25..	Not	July 1 to frost.
Brachycome iberidifolia	Boxes, hotbed.	April 17..	June 3 to June 15.	June 25 to frost.
Cosmos hybrida	" "	" 8..	" " ..	Did not flower.
Celosia (3 varieties)	" "	" 10..	" " ..	July 10 to frost
Chrysanthemum coronarium	" "	" 10..	" " ..	" 1 "
" frutescens	" "	" 10..	" " ..	" 10 "
" carinatum hybridum Burridgeanum	" "	" 10..	" " ..	" 3 "
Dahlias, single	" "	" 8..	" " ..	" 10 "
Gaillardia picta	" "	" 15..	" " ..	June 25 to frost.
" Lorenziana	" "	" 15..	" " ..	" 25 "
Godetia nana	Outside	May 25..	Not	" 20 "
Helichrysum bracteatum	Boxes, hotbed.	April 10..	June 3 to June 15.	July 15. Everlasting.
Nicotiana affinis	" "	" 10 ..	" " ..	June 20 to frost.
Nigella damascena	" "	" 12..	" " ..	" 15 to July 5.
Portulaca double	Outside.	May 25..	Not	" 25 to frost.
Phlox Drummondii	Boxes, hotbed.	April 8..	June 3 to June 15.	" 10 to severe frost.
Petunias, single mixed	" "	" 30..	" " ..	July 3 "
" double "	" "	" 30..	" " ..	" 3 to frost.
Salpiglossis variabilis	" "	" 15..	" " ..	" 1 "
Stocks, double German 10 weeks	" "	" 17..	" " ..	" 5 "
" " large flowering	" "	" 17..	" " ..	" 5 "
Scabiosa major	" "	" 10.	" " ..	June 20 "
" minor	" "	" 10..	" " ..	" 20 "
Verbena hybrida auriculæflora	" "	" 17..	" " ..	July 10 to severe frost.
Zinnia elegans	" "	" 25..	" " ..	" 10 to frost.

The delay in the sowing of Petunias was due to the late arrival of seed, but as pains were taken to push the plants along, very little time was lost, and the results were particularly fine. The double flowers included the finest we have ever grown here, being very large, compact and beautifully fringed. Special attention is called to the Scabiosa (Sweet Scabious), an annual not generally cultivated here, but which is worthy of more attention. It is very hardy, and its varied coloured flowers of rich

texture render it quite conspicuous. It also has a very delicate fragrance. In Asters two types, Queen of the Earliest and Queen of the Market, are deserving of special mention. Both of these are very early and desirable. Another point to which we would draw attention is the desirability of growing the single dahlias from seed and treating them as annuals. They are exceptionally easy of propagation and very vigorous growers, and if sown early in April, will be covered with flowers about the middle of July of brilliant colouring and rich texture, their long stems rendering them invaluable for cutting.

Annuals sown outside.—As many people do not care to go to the trouble of making a hot-bed, a test was made during the past season to ascertain what varieties of annuals could be successfully grown by sowing them in the open. The result is given below, and shows clearly that a very pretty garden may be had without the necessity of a hot-bed. The seed was sown on April 25, in well prepared beds, in rows varying from twelve to twenty-four inches apart, according to the expected growth of the variety, and thinned out to six inches apart in the row as soon as the seedlings could be handled. Care should be exercised in regard to the distance apart of the rows, in order to avoid overcrowding when the maximum growth has been obtained.

Name of Variety.	Remarks.
Asters Truffauts Pæony Perfection	Flowered well ; made good show.
" Queen of the Earliest	" for long season.
" " Market	" "
" Imbricated Pompon	" well ; made good show.
" Single Large Flowering	" "
" Pyramidal Bouquet	" "
" Perfection	" "
" Lilliput	" "
" Dwarf Multicolor	" "
Amarantus Superbus	Ornamental leaved ; made fine plants.
Ageratum Mexicanum	Flowered well.
Abronia umbellata	"
Brachycome iberidifolia	" early and well and made fine show.
Calendula officinalis	" early and exceptionally well.
Cosmos Hybrida	Did not flower.
Celosia pyramidalis nana	Flowered well.
Chrysanthemum Coronarium	" early and well.
" frutescens	" well.
" carinatum Burridgeanum	" early and well.
Godetia nana	" exceptionally well and made fine show.
Helichrysum bracteatum	" somewhat late.
Nigella damascena	" exceptionally well and made very fine show.
Pansy (Bedding mixture)	" well.
Portulaca Double Large Flowering	" exceptionally well and made very fine show.
Phlox drummondii grandiflora	" " "
Salpiglossis variabilis	" " "
Gaillardia picta	" " "
" " Lorenziana	" " "
Nicotiana affinis	" well.

SWEET PEAS.

A collection of named varieties were sown the past spring with excellent results. All flowered well. The following varieties were considered the most striking :—

Othello.—A very large flower, deep crimson in colour.

Prince Edward of York.—Carmine scarlet, with crimson wings.

Aurora.—Striped rosy orange on white ; a most attractive variety.

Lottie Hutchins.—Pencilled pink on a straw yellow.

Salopian.—Rich deep crimson red, very large and of fine form.

Sadie Burpee.—The best of the white varieties.

Hon. F. Bouverie.—Salmon, with creamy pink wings.

Lady Nina Balfour.—A beautiful silvery lavender.

Admiration.—Pinkish heliotrope, wings a shade lighter.

HERBACEOUS PERENNIALS.

This class of plants continue to attract special attention, on account of their hardiness and ease of cultivation. The former situation of the perennial bed having been found undesirable, a new location has been selected, to which the old plants have been removed, and in which new varieties are being planted as fast as procured. The following varieties were received during the spring of 1900, and the appended notes show their condition after having passed through one winter. Most of them flowered nicely in their season :—

Asclepias tuberosa.
Aster, W. Bowman.
" White Queen.
Achillea Millefolium rubrum.
" Sibirica White.
" Ptarmica Fl. Pl.
Amthemis tinctoria kelwayi.
Artemisia Stellariana.
Anemone Narcissiflora.
Ajuga reptans atropurpurea.
" genevensis.
Boltona latisquama.
" Asteroides.
Campanula altaica.
Chelone barbata.
Centaurea montana alba.
" macrocephala.
Coreopsis verticillata.
" Delphinifolia.
Erigeron macranthus.
Funkia lancifolia.
Geranium maculatum.
" Wilfordi.
" Sanguineum.
" platypetalum.
Helenium Grande striatum
Helianthus maximiliana.
" gigantea.
Hemerocallis disticha Fl. Pl.
" fulva.
" variegata.
" Kwanso Fl. Pl.
" graminæfolia.
" dumortieri.
Iris variegata arquinto.
" " Pancrace.
" " Minos.
" " Innocenza.
" " Coquette.
" " Darius.
" " Souvenir.
" " Henry Havard.
" "
" squalens.
" " Jacquesiana.
" " Lady Seymour.
" " La Tristesse.
Iris squalens, Tarquin.
" " Minerva.
" " Hector.
" " Haydee.
" " Dina.
" " Bronze Stoffel.
" " La Marmora.
" " Cerberus.
" amoena Julia Grise.
" " Maria Theresa.
" " Crebillon.
" " Victor Lemoine.
" " Mrs. H. Darwin.
" plicata.
" " Severtii.
" " Lord Seymour.
" " Gisela.
" neglecta Sapho.
" " Arlequin Milanais.
" " Agathe.
" " Hericartiana.
" pallida.
" " Chamœleon.
" sibirica.
" " violacea.
" " alba.
" " hæmatophila.
" germanica.
" " Verschuur,
" pumila.
" " lutea.
" " Cinerea.
" " gracilis
" Florentina.
" ensata.
" " Biglumis.
" " oxypetala.
" cristata.
" nudicaulis.
" furcata.
" Goldenstadtiana coerulescens.
" giganteus.
" flavescens.
" virescens.
" aurea.
" Balkana.
" Chamæiris.
Iris biflora.
" blondovi.
" ruthenica.
" Cengialti.
" orientalis.
" Hungarica.
" prismatica.
Lysymachia clethroides.
Physostegia Virginiana alba.
Pyrethrum uliginosum.
Phalaris arundinacea fol var.
Phlomis fruticosa.
Papaver orientale.
Phlox decussata pantheon.
" " tourbillon.
" " dwarf white.
" carolina ovata.
" amœna.
" divaricata.
" subulata lilacina.
" reptans.
" pilosa.
Poterium officinale.
Rudbeckia laciniata.
Spirea venusta pallida.
" kamschatka.
" filipendula.
" " fl. pl.
" palmata.
" ulmaria.
" digitata glabra.
" ulmaria fl. pl.
" pubescens.
Symphytum asperrimum.
Sidalcea candida.
Sempervivum montanum.
Solidago rigida.
" Missouriensis.
" gigantea.
Thermopsis caroliniana.
Tradescantia virginiana alba.
" " cerulea.
Valeriana officinalis.
Veronica virginica.
" elegans carnea.
" spicata.

BULBS PLANTED 1901.

A consignment of bulbs were received from the Central Experimental Farm this autumn and were planted in the perennial block. They consist of : Tulips, in varieties; Crocus, Scilla's, Iris Hispanica, Snowdrops, and Frittilaries.

A covering of manure was placed on the bed, and the results will be reported on the next season. A consignment of Hyacinths, Narcissus and Lilium candidum were potted and will be flowered in the Superintendent's house during the winter. A supply of different sorts of Lilies were also received from Ottawa.

DISTRIBUTION OF GRAIN, POTATOES, ETC.

A larger distribution than usual was made of potatoes, maple seed, rhubarb, flower and brome grass seed.

The following quantities were sent out to applicants :—

Grain of all kinds in 3-pound bags	555
Seedling trees, packages	310
Shrubs, packages	113

Distribution of Potatoes, &c.

Potatoes in 3-pound bags	334
Maple seed in 1-pound bags	471
Rhubarb seed, packages	217
Flower seed, packages	201
Brome grass seed, in 1-pound packages	270

Box Elder or Manitoba Maple Seeds.

The following reports have been received from parties to whom Manitoba Maple seeds were sent in 1-pound packages, during the spring of 1900 :—

Number of applicants supplied	240
Number of reports received	89

	Success.	Failures.
Seeds sown on summer fallow	3	12
" Spring ploughing	29	6
" Fall ploughing	22	11
" Breaking	9	3
" Garden (dug with spade)	3	..

Largest number of plants raised from 1-pound packet, 2,000.

Maximum height of seedlings at end of season, 2½ feet.

Reports of Distribution of Collections of Trees, Spring 1900.

Only eight per cent of parties supplied with trees reported on them. These all report having received the packages in good condition.

Number of applicants supplied	525
Number of reports received	43

Average per cent of cuttings struck :

	Per cent.
Russian Poplars	20
Cottonwoods	34
Willows	13

Maximum growth, summer 1900 :

	Feet.
Russian Poplar	4
Cottonwood	3
Willows	3

PROPAGATION OF TREES FOR DISTRIBUTION.

Caraganas, Russian Poplars, Elms, and Willows, were grown for free distribution. The Caraganas were propagated from seed. The seed was sown the same as garden peas, in rows thirty inches apart, about one inch deep and about one inch apart in the rows. Fresh gathered Elm seed was sown in shallow drills 12 inches apart and covered with fine soil by means of a garden rake.

PROPAGATION OF TREES FOR THE FORESTRY BRANCH OF THE DEPARTMENT OF THE INTERIOR.

Under your instructions some ten acres of land was set apart for the growing of trees for the above department.

The principal part of these were Native Ash-leaved Maples, grown from seed, but a number of Elms and Willows were also grown.

The Maple seed was sown in drills three feet apart, the seeds touching each other in the row. Most of the seed was soaked before sowing. In some instances the seed was ploughed under, by striking out a furrow three inches deep and placing the seed at the bottom of the furrow, and ploughing a second furrow over it. Adjoining rows were struck out with a Planet Junior drill two inches deep, and the seed sown by hand and the soil filled in with a rake. The rows covered with the plough produced 160 trees to the chain of row, and the rows filled in with rake 733 trees to the chain. Either the ploughing was too deep, or else the soil when thrown in with a plough was too hard and lumpy for the best results. Altogether 110,000 maples and elms were grown from seed, and in addition seedling elms were collected from the natural bluffs by the river side.

SAMPLES FOR EXHIBITION PURPOSES.

Five cases of samples were sent to the Glasgow Exhibition during the past year. These were exhibited along with samples from the other Experimental Farms, and received very favourable notices.

Last fall an additional exhibit was prepared from the crop of 1901, and forwarded to Glasgow; although not as extensive as the first exhibit, it gave a very fair idea of the character of the past year's crop.

On completion of the Dominion Government building on the Brandon fair grounds this year, a very complete exhibit was prepared and installed therein, and the display was greatly augmented by a tasty exhibit from the Central Experimental Farm at Ottawa.

A small collection of samples was sent to the Dominion Government agency in Texas.

A somewhat extensive display of Horticultural products was made at the Brandon Horticultural Exhibition.

NEW BREAKING.

About three acres of pasture field which had been in Western Rye Grass for eight years was broken up in the spring, thoroughly disc-harrowed, and at once re-sown with Brome Grass seed in the proportion of fifteen pounds of seed per acre. A good

catch was obtained and furnished abundance of pasture from early August until winter set in. Two acres of original prairie in the same field was also broken up, backset and harrowed. This will be sown to brome seed early next spring. It is not found necessary to keep the cattle out of a field when sowing a portion of it with brome grass. No doubt it would be advisable to do so for the first few months if the land were at all wet; otherwise there would be danger of tramping out the young grass plants.

VISITORS.

The number of visitors to the Experimental Farm during this year approximated ten thousand.

A noticeable feature was the large number of delegates from the Western and South-western States. These were representative farmers sent to examine and report on the Canadian North-west as a desirable location for the surplus population of their respective States. They appeared greatly impressed by the crops of grain and grasses growing on the Experimental Farm.

Two railway excursions were run to the farm during the year, one along the main line of the Canadian Pacific Railway from Rosser west, and the other from the south-western branches of the Canadian Pacific Railway. Each excursion carried about six hundred, nearly all being farmers and their families.

The provincial ploughing match and farmers' picnic were also held on the farm, and largely attended. The ploughing matches are already exerting an influence for good in the province, and the ploughing done has greatly improved in late years.

FARMERS' MEETINGS.

A number of farmers' meetings were attended during the past year, and the turn-out of farmers was much above the average, the attendance in some instances reaching four hundred.

Meetings were attended at the following places :—

Winnipeg	Jan. 18	Cartwright	Feb. 7
Brandon	" 19	Winnipeg	" 20
Carman	" 29	"	" 21
Miami	" 30	"	" 22
Nelson	" 31	MacGregor	Mar. 16
Morden	Feb. 1	Winnipeg	April 16
Manitou	" 4	Rapid City	May 25
Pilot Mound	" 5	Brandon	July 24
Crystal City	" 6	Winnipeg	" 31

METEOROLOGICAL TABLES.

Month.	Highest Temperature		Lowest Temperature		Total Rainfall.	Total Snowfall.	Total Amount of Sunshine.
1900.	on	°	on	°	Inches.	Inches.	Hours.
December	21	39·4	31	−28·6	.....	12	86·3
1901.							
January	13	38 2	2	−41 6	.....	17	99·1
February	13	25 5	2	−25	.....	.....	126·9
March	29	41 2	5	−18·5	.....	.....	166·4
April	30	85	18	13	.....	.....	170·8
May	28	92	13	28	1·12	.....	330·3
June	1	85·5	7	26·5	7·72	.....	182·5
July	19	92·5	1	44	1·93	.....	243·6
August	16	92	30	40·1	1·13	.....	286·1
September	2	91·2	18	22	3·34	.....	127·5
October	21	78·9	27	21	63	.....	183·8
November	1	53	22	1	11	3	109
Totals	.....	.....	.....	.....	15·98	32	2,112·3

CORRESPONDENCE.

This year 4,804 letters were received and 3,210 despatched, irrespective of 2,755 circulars sent out.

I have the honour to be, sir,

Your obedient servant,

S. A. BEDFORD,

Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T,
November 30, 1901.

DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit herewith the fourteenth annual report of the operations on the Experimental Farm for the North-west Territories, at Indian Head, Assiniboia, during the year 1901.

The past season has been one of the most successful ever experienced, not only on the Experimental Farm, but throughout the whole country. Bright prospects from beginning to end of the growing season consummated in the most abundant crop ever reaped in any country, and although unsettled weather for a time caused some fears for the safety of the reaped grain, the conditions became more favourable when the real North-west fall opened, and in proportion to the total amount of grain saved in good condition the loss is very slight.

Last winter was mild with few or no storms. Snow fell in the middle of November, and in some districts remained on the ground until April ; while in others it disappeared in March.

On account of the wet condition of the land when it froze up in the fall of 1900, and the frequent rain and snow storms during April, seeding was late in starting, but from the beginning to the end of May, while seeding was in progress, the weather and soil conditions were all that could be desired.

June opened hot and dry, and some apprehension was felt for the young grain plants, but a rain which was general throughout the Territories on the 12th, followed by warm and frequently heavy showers continuing to the end of July, caused a remarkable growth of cereals in every part of the Territories. In previous years some districts have been more favoured than others in this respect, but this year all have fared alike.

Harvest commenced from the 15th to the 20th of August, and was completed early in September. No frost was reported till the 17th, by which time all grain, except some late oats, was in stook.

There were no heavy winds during the season, and no injury was sustained by the grain at any time.

Shortly after stacking and threshing had commenced, in Assiniboia at least, heavy falls of rain and snow took place and caused delay in securing the grain, as well as more or less loss in badly stacked and stooked grain. The unfavourable weather, with occasional bright days, continued to October 13, when a radical change took place, and from that time to the present not a day has been lost.

Many very heavy yields of grain are reported from almost every part of the Territories. In Assiniboia, where wheat is the principal crop, yields of 50 to 55 bushels per acre have been threshed from fields of 100 acres or over, in the Indian Head, Wide-awake and Abernethy districts ; while many farmers have secured 40 to 45 bushels per acre, in some cases on four to six hundred acres.

In the Regina, Pense, Moosejaw and Sintaluta districts equally heavy crops have been harvested. One family of father and six sons in the Pense district are reported to have between seventy-five and eighty thousand bushels of wheat to market.

Settlers with ten, fifteen or twenty thousand bushels are numerous in the districts mentioned, and no doubt the same may be said of the more easterly portion of Assiniboia, although I have no direct information in the matter.

The newly settled districts along the Soo line of railway have been equally fortunate, and a large influx of settlers is expected in the districts north of Weyburn, Milestone and Yellow Grass as soon as spring opens next year.

Saskatchewan reports a good crop of wheat and oats, and Alberta has the heaviest crop of oats it has ever secured. .

The oat crop throughout the Territories is a heavy one. The majority of farmers in the wheat-growing sections have paid little attention to this important cereal, being content to sow on stubble land with little or no cultivation and thresh from 30 to 50 bushels per acre ; whereas, some, and the number is increasing, are using fallowed land and securing 75 to 100 bushels. In several instances the yield has been over 100 bushels per acre this year.

Fallowed land, the past season, as in every other year, has given the highest yield of wheat per acre, and so far as can be ascertained, the crop grown thereon has sustained no injury from rust, smut or other cause. In some cases the quantity of straw was excessive and lodged in places, but this apparently has had no appreciable effect on the yield.

Grain sowed on stubble land ploughed or cultivated in the fall of 1900 or just before seeding, invariably gave good returns ; while on similar land without cultivation the yield was comparatively light.

Cattle throughout the Territories have not done as well during the past season as in 1900. Flies and soft grass are no doubt accountable for this to a considerable extent. The heavy rains in June and July made the grass soft and watery and caused a most abundant crop of mosquitoes and flies. The price of export steers has kept up, but the demand for stockers has not been so brisk as in former years.

EXPERIMENTAL FARM CROPS.

The crops on the Experimental Farm the past season were, without an exception, the best since the commencement of operations in 1887. Everything grown yielded above the average and many varieties of grain were above any previous record. The sample too, surpasses that of any other year.

Pasture, hay, corn, potatoes, vegetables and roots (with the exception of field carrots, which although above ordinary years, were not in keeping with the other crops), were a most gratifying success.

All the tests made with grain, roots, fodder-plants, &c., came through the season without a single set-back from winds, frost or other causes, and all have been safely secured and threshed in good condition.

Small fruits were a fair crop, and crab-apples and plums produced abundantly.

Trees and shrubs of all kinds made a strong, healthy growth.

EXPERIMENTS WITH SPRING WHEAT.

Seventy-one varieties were tested on 1-20th or 1-40th acre plots ; eight of the same varieties on plots ranging from $\frac{3}{4}$ acre to 10 acres. Red Fife was used in the test of fertilizers ; rotation test ; test of sowing selected, well-cleaned and small seed, and in the test of blue stone as a preventive of smut.

TEST OF VARIETIES IN UNIFORM PLOTS.

Seventy-one varieties, of which fifty had been previously tested and twenty-one were new sorts, were sown on May 7 by hoe-drill, at the rate of one and one-half bushels per acre.

The field chosen for this test of wheat, as well as for the uniform plots of oats and barley, was one of twenty acres entirely surrounded by wind-breaks of trees, and is of a uniform quality of soil—a clay loam. Wheat seeding was later than it otherwise would have been on account of wet spots in the field.

The land had been well fallowed in 1900, having received one deep ploughing in May, and several surface cultivations during the growing season. No weeds were allowed to grow and after the grain appeared above ground, the plots were gone over several times and anything injurious to the crop was removed.

All the varieties germinated evenly and well, and made a strong, healthy growth, without sustaining the least injury from smut, rust, frost or any cause whatsoever. A few days before being cut, rust appeared on the leaves of some of the varieties but the grain was not affected.

WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Mason	Aug. 19..	104	47	Weak ..	5	Bald ...	5,000	67	..	63½	Slightly.
Australian No. 13	" 24..	109	50	Strong .	4	" ...	5,240	66	40	69⅓	
Huron	" 23..	108	48	" ..	4	" ...	5,440	66	40	62⅔	"
Countess	" 18..	103	54	" ..	4	" ...	5,980	65	20	59⅔	
Goose	" 29..	114	50	Medium	2½	Bearded	4,380	63	..	65	
Rideau	" 22..	107	44	" ..	3¾	Bald ...	4,980	62	40	62	"
Rio Grande	" 29..	114	53	Strong .	4½	Bearded	6,620	62	..	59	"
Stanley	" 20..	105	52	" ..	4	Bald ...	5,960	61	40	62½	
Essex	" 24..	109	55	" ..	4½	" ...	4,800	61	20	60	
Dawn	" 20..	105	47	" ..	3	" ...	3,650	61	..	64	
Clyde	" 17..	102	56	" ..	4½	" ...	5,360	60	40	62½	
Beaudry	" 25..	110	53	Weak ..	3½	Bearded	4,910	60	40	64	"
Minnesota No. 181	" 25..	110	53	Strong .	4	Bald ...	5,880	60	..	62	
Vernon	" 26..	111	46	Medium	3	Bearded	6,280	59	20	63	"
Minnesota No. 149	" 24..	109	51	" ..	4	Bald ...	6,320	59	20	57½	
Dion's	" 23..	108	55	Strong .	5	Bearded	6,180	59	20	61	"
Australian No. 23	" 23..	108	52	" ..	4¼	Bald ...	6,180	58	40	61½	
Beauty	" 20..	105	54	" ..	5	" ...	6,480	58	40	59	"
Speltz	" 17..	102	46	Weak ..	2	" ...	2,275	58	20	46½	
Colorado	" 28..	113	49	" ..	3½	Bearded	3,750	58	20	63	"
Dufferin	" 26..	111	54	Medium	4¾	" ..	4,700	58	..	62	
Minnesota No. 163	" 24..	109	52	Strong .	4	Bald ...	6,420	58	..	62½	
Australian No. 27	" 21..	106	53	" ..	4¼	" ...	7,000	58	..	60	
Weldon	" 17..	102	53	" ..	4¼	" ...	6,880	57	40	62	"
Wellman's Fife	" 24..	109	59	" ..	4⅝	" ...	5,040	57	40	61⅝	
Monarch	" 25..	110	52	Medium	5	" ...	6,600	57	40	58	
Roumanian	" 27..	112	52	" ..	3¼	Bearded	3,820	57	20	65⅓	
Minnesota No. 169	" 26..	111	53	" ..	4	Bald ...	5,200	57	20	60½	
Red Fern	" 28..	113	55	" ..	5	Bearded	3,980	57	20	63	
Herisson Bearded	" 28..	113	46	Weak ..	2½	" ..	3,660	57	20	63½	"
Percy	" 18..	103	51	Strong .	4	Bald ...	4,160	57	20	61⅓	
Preston	" 29..	114	47	" ..	3	Bearded	4,880	57	20	63⅓	
Hastings	" 24..	109	49	Medium	3½	Bald ...	3,360	57	20	63⅓	
Red Fife	" 25..	110	52	Strong .	3½	" ...	5,220	57	..	61⅓	
Advance	" 25 .	110	52	" ..	4	Bearded	5,370	57	..	62⅔	
Hungarian	" 26..	111	49	Weak ..	3	" .	3,520	56	40	64⅔	
Japanese	" 23..	108	52	Strong .	3½	" ..	4,520	56	40	60⅓	
Australian No. 19	" 23..	108	48	Medium	3½	Bald . .	6,280	56	40	60½	
Pringle's Champlain	" 26..	111	50	" ..	5	Bearded	7,120	56	40	62½	"
Admiral	" 23..	108	53	Strong .	4	" ..	5,980	56	20	62½	"
Campbell's White Chaff	" 23..	108	54	Weak ..	3½	Bald ..	4,560	56	..	62½	"
Ladoga	" 22..	107	50	Strong .	3½	Bearded	3,280	55	40	62½	

WHEAT—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
White Connell	Aug. 24	109	55	Strong	4	Bald	3,420	55	20	62	
Blair	" 19	101	49	Weak	3½	"	4,360	55	..	62½	Slightly.
Crawford	" 14	99	49	Medium	3	"	5,160	55	..	62½	
White Russian	" 20	105	57	Strong	4¾	"	5,580	54	..	61½	
Progress	" 20	105	52	"	4	"	3,560	54	..	62½	
Laurel	" 26	111	51	Weak	5½	"	5,120	54	..	57½	
Cassel	" 23	108	47	Strong	3½	"	3,200	54	..	63	
Australian No. 25	" 22	107	52	"	4¼	"	4,900	54	..	59½	
Blenheim	" 26	111	53	"	4¼	Bearded	5,175	54	..	62	
Alpha	" 25	110	50	"	3½	"	5,650	53	40	62	
Fraser	" 15	100	51	Medium	3	"	3,780	52	..	62	
Bishop	" 21	106	51	Strong	4½	Bald	4,480	52	..	62½	
White Fife	" 19	104	55	"	5	"	5,720	52	..	61½	
Plumper	" 22	107	48	Medium	3½	Bearded	4,540	51	..	63½	
Chester	" 23	108	43	"	3¾	Bald	4,440	50	40	61	
Australian No. 9	" 22	107	50	Strong	4	"	5,080	50	40	59	
Captor	" 23	108	54	"	4¾	"	5,780	50	20	62½	
Ebert	" 14	99	46	Medium	3½	"	5,220	50	20	64	
Crown	" 24	109	54	"	4¼	"	3,590	50	..	62¾	
Benton	" 23	108	50	Strong	4	"	4,160	49	20	63	
Robin's Rust-proof	" 27	112	44	Weak	3¾	"	4,800	49	20	64⅓	Badly.
Red Swedish	" 29	114	48	"	4	Bearded	4,080	49	..	63½	Slightly.
Early Riga	" 13	98	48	Medium	3½	Bald	4,160	49	..	63½	
Australian No. 10	" 23	108	47	Strong	3¾	"	6,160	48	40	63	
Harold	" 15	100	43	Medium	2½	Bearded	4,160	48	..	64	
Angus	" 25	110	45	Strong	3½	Bald	2,840	46	..	62	
Norval	" 19	104	52	"	3¾	Bearded	3,880	45	40	61	
Cartier	" 21	106	44	"	4	"	4,040	44	40	63	
Byron	" 18	103	46	"	3½	"	4,200	43	40	61¾	

NOTE.—Where the foregoing are noted as 'slightly rusted' it applies to the leaves, as the straw was not in any way affected.

TEST OF VARIETIES IN FIELDS.

Eight varieties of wheat were sown on plots of three-fifths to ten acres of land worked in various ways as shown in the accompanying table.

The fallow land was ploughed seven inches deep in May, 1900, and cultivated four times during the season.

The Brome backsetting was Brome sod broken two inches deep in June; backset four inches deep in August, and cut up with disc-harrows after harvest. A few of the grass-roots sprouted in the spring, but unless closely looked for could not be noticed in the crop.

The stubble land had been ploughed seven inches deep in the fall and well harrowed.

The prairie sod was part of a fifteen year old pasture field, broken and backset in the usual way.

The crop was very heavy in all cases, but with the exception of Preston on fallow, no grain lodged or was in any way injured. Preston was struck by rust a few days before being ripe, but as only the leaves were affected, the yield was not reduced.

The yield of all varieties was very satisfactory; and the sample is an excellent one

Name of Variety.	Character of Soil.	Size of Plot.	Date of Ripening.	Number of Days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Proportion Rusted.
		Acres			Inches		Inches		Bush.	Lbs.	
Preston	Fallow	5	Aug. 26	114	53	Medium	4	Bearded	54	54	A little rust on leaves.
White Russian	"	$\frac{1}{40}$	" 26	114	55	Strong..	$4\frac{1}{2}$	Bald ...	49	40	
Red Fife	"	$\frac{3}{40}$	" 25	113	53	" ..	4	"	49	..	"
"	Backsetting (native sod)	$1\frac{1}{2}$	" 27	117	56	Medium	4	"	48	..	
"	" (brome sod)	1	" 23	108	54	Strong..	4	" ...	45	50	
Preston	" "	4	" 16	104	57	" ..	$4\frac{3}{4}$	Bearded	45	45	
Red Fern	" "	$1\frac{3}{40}$	" 20	109	58	" ..	5	" ..	45	..	
Huron	Fallow	$\frac{3}{40}$	" 22	110	58	Medium	4	" ..	45	..	"
Stanley	Backsetting (brome sod)	4	" 16	102	57	Strong..	$4\frac{1}{2}$	Bald ...	40	45	
Wellman's Fife	" "	$4\frac{1}{2}$	" 23	113	58	" ..	$4\frac{1}{2}$	"	39	20	
Red Fife	Stubble, fall ploughed	1	" 24	114	57	" ..	4	"	36	20	
Percy	" " ..	6	" 20	109	55	" ..	$4\frac{1}{4}$	"	36	18	

TEST OF BLUESTONE AS A PREVENTIVE OF SMUT IN WHEAT.

Sown on May 7, on 1-40th acre plots of fallowed land, by hoe-drill, at the rate of $1\frac{1}{2}$ bushels per acre.

Seed.	Condition.	Treatment.	On 25 sq. feet.	
			Good heads.	Smutty heads.
Red Fife	Clean	1 lb. bluestone to 10 bush. wheat, dipped 1 minute.	943	11
"	"	" " " 1 hour	949	..
"	Smutty	" " " 5 minutes	873	8
"	"	Untreated	519	431

WHEAT—TEST OF SOWING SELECTED, WELL-CLEANED AND SMALL SEED.

In this test the selected seed used was hand-picked when ripe and before being cut in 1900, and thoroughly cleaned by mill ; the well-cleaned seed was our best Red Fife, run twice through the fanning-mill and was a large, plump sample. The small seed was what was taken out of the well-cleaned grain.

The seed was sown on 1-20th acre plots of fallowed land, by hoe-drill, at the rate of $1\frac{1}{2}$ bushels per acre, on May 7.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Red Fife, well-cleaned	Aug. 28..	113	51	Strong....	$3\frac{1}{2}$	Bald.	5,100	67	..	$61\frac{1}{2}$
" selected	" 28..	110	51	"	$3\frac{1}{2}$	"	5,520	59	40	63
" small seed	" 28..	114	52	"	$3\frac{1}{2}$	"	4,700	59	40	62

TEST OF FERTILIZERS.

Six plots of 1-40th acre each were sown with Red Fife Wheat ; five of which were treated with artificial manures, and the sixth used as a check-plot.

While the grain was growing no difference could be observed in the plots, and it will be noticed that the unfertilized plot yielded higher than three of the treated plots and nearly as high as the other two. It is, however, worthy of note that for the past two years, the plot treated with a mixture of the three manures, has given the highest yield.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. Lbs.	Lbs.
Plot No. 1.— Nitrate of soda, 100 lbs. per acre (half sown when grain was 2 inches high, balance when 6 inches high)	May 15	Aug. 28	105	50	Strong..	3½	Bald....	5,920	61 20	62
Lot No. 2.— Nitrate of soda, 200 lbs. per acre (half sown when grain was 2 inches high, balance when 6 inches high)	" 15	" 26	103	51	" ..	3¾	"	5,480	58 40	62
Plot No. 3.— Superphosphate No. 1, 400 lbs. per acre (sown before grain and harrowed)	" 15	" 27	104	51	" ..	3½	"	7,280	52 ..	62
Plot No. 4.— Check-plot. Unfertilized	" 15	" 28	105	50	" ..	3¼	"	6,600	62 40	61
Plot No. 5.— Muriate of potash, 200 lbs. per acre (sown before grain and harrowed)	" 15	" 26	103	51	" ..	3¼	"	8,080	65 20	62½
Plot No. 6.— Superphosphate No. 1, 200 lbs. per acre ; muriate of potash, 100 lbs. per acre ; nitrate of soda, 100 lbs. per acre (half sown before grain and harrowed, balance when grain was 2 inches high)	" 15	" 27	104	52	" ..	3½	" .. .	8,080	65 20	53½

SPELTZ.

Sown on 1-20th and 3-20th acres of fallowed land by hoe-drill, at the rate of two bushels per acre.

The straw proved very weak and lodged badly, but from appearances while growing, would make good fodder if cut at the proper time.

Speltz is apparently well adapted to the country, and may be grown for the straw or grain for fodder ; the yield of the latter being very satisfactory.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Bush. Lbs.	
Speltz	Aug. 24..	102	46	Weak ...	2	Bald.	2,275	58 20	46½
"	" 26..	104	47	" ...	1¾	" . . .	2,475	52 4	46½

FALL WHEAT.

When visiting Southern Alberta in connection with Farmer's Institute work, in March last, many fields of fall wheat were noticed on the drive from Magrath to Pincher Creek, which have since given large yields of grain.

With the object of again testing fall wheat on the farm, seed of two varieties was secured and sown on August 5, on a particularly well prepared piece of fallowed land.

The seed was put down as deep as it was possible for the seeder to work, in the hope that the roots may be sufficiently far below the surface to save them from the effects of spring thaws and frosts, which have heretofore been fatal to fall wheat.

When the first killing frost came this fall, the wheat had attained a height of eight inches, and the leaves formed a thick mat entirely covering the ground.

While it is very gratifying to learn that fall wheat has been such a success in Alberta this year, it is not safe to conclude that it will always be so. Last spring was particularly free from thaws and frosts, and as soon as the growth started there was no set-back ; resulting in an excellent crop. In former tests made here with fall wheat, there has never been any difficulty in getting it safely through the hardest winter, and in 1899, which was perfectly free from spring thaws and frosts, it produced a very heavy crop of straw, but the grain was unfortunately struck by rust and completely destroyed. In all other trials, the alternate thawing and freezing from April 20 to May 25 has entirely killed the crop.

These thaws and frosts have hitherto made the growing of clovers very difficult on the Experimental Farm, and so long as the Territories are subject to them, it will be advisable not to risk too much on either fall wheat or clovers.

EXPERIMENTS WITH OATS.

Sixty-four varieties were tested on plots of 1-20th acre each ; fourteen of the same varieties were sown on plots of ½ to 11 acres, and Banner was used in the test of formalin as a preventive of smut.

The crop on the whole surpassed any previously grown on the farm.

With the exception of 8 acres of Banner oats sown on backsetting, and the plots in the rotation test, all the tests were made on land fallowed in 1900 and in good condition for crop.

The seed used was well cleaned by mill and was of excellent quality.

TEST OF VARIETIES.

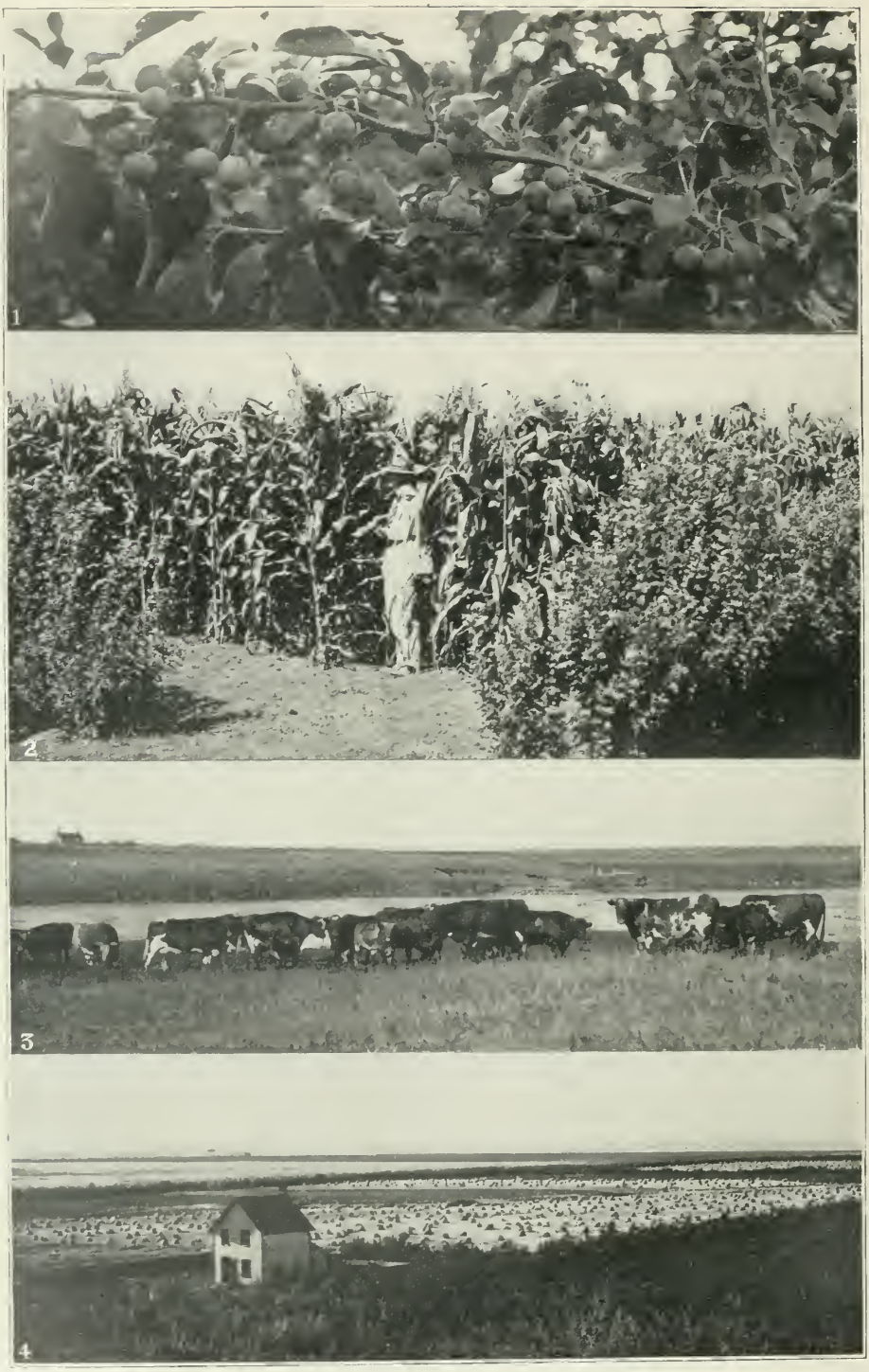
Sown on fallow by hoe-drill, on May 9, at the rate of 2 bushels per acre.

The grain stood up well, and none of the plots sustained any injury from lodging, smut or rust, except Bonanza, which was, for some unknown reason, very smutty.

The rust mentioned in the following detailed result of the test was simply on the leaves and did no damage whatever.

Oats—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush. Lbs.	Lbs	
Abundance	Aug. 18	101	51	Strong	9½	Branching	5,320	147 2	41	
Thousand Dollar	" 18	101	51	"	9½	"	6,320	138 28	41¾	Slightly.
American Beauty	" 19	102	53	Medium	10	"	5,640	137 2	39½	
Improved American	" 18	101	55	Strong	10½	"	4,360	135 30	42	
Mennonite	" 19	102	53	"	10¼	"	5,260	134 4	39	
Lincoln	" 16	99	56	"	9½	"	2,100	130 20	41½	
Banner	" 21	104	60	"	10½	"	4,820	129 14	42	
American Triumph	" 16	99	56	"	10¼	"	4,000	129 14	40½	
Wide-awake	" 16	99	57	"	10¾	"	4,780	129 14	42½	
Danish Island	" 17	100	56	"	9½	"	4,960	128 8	41	
Early Golden Prolific	" 15	98	53	"	9½	"	4,720	127 2	40½	
Golden Beauty	" 18	101	56	"	8¾	"	2,920	126 16	40½	
Improved Ligowo	" 15	98	58	Weak	9	"	5,360	125 30	41	
Early Maine	" 16	99	55	Strong	10¼	"	5,680	124 24	40	
Newmarket	" 17	100	58	Weak	9	"	3,980	124 24	43	Slightly.
Early Blossom	" 21	104	59	Strong	13	Sided	6,900	121 26	41	
Wallis	" 20	103	60	Medium	10½	Branching	4,900	121 6	40½	
Siberian	" 21	104	62	"	13½	Sided	5,720	120	38½	Slightly.
Columbus	" 21	104	58	Weak	10	Branching	3,720	120	38½	
Abyssinia	" 20	103	56	Strong	10½	"	4,960	119 14	41	
Early Gothland	" 19	102	57	"	10½	Sided	4,820	119 14	43	
Oderbruch	" 19	102	57	"	11	"	4,200	119 14	41	
Holstein Prolific	" 16	99	55	"	11	Branching	4,600	118 8	40½	
Bavarian	" 17	100	54	"	9½	"	4,580	117 22	37	
Goldfinder	" 26	109	53	Medium	10½	Sided	3,620	116 16	39½	
Buckbee's Illinois	" 17	100	55	Strong	11	"	5,500	115 30	41½	
Joanette	" 24	107	48	"	10	Branching	5,600	114 24	38	
Prolific Black Tartarian	" 22	105	57	"	10	Sided	3,640	114 24	38	
White Russian	" 19	102	57	"	8½	Branching	3,920	113 18	43½	
California Prolific Black	" 20	103	61	"	14	Sided	5,180	112 32	37½	
Early Archangel	" 23	96	53	Weak	10½	Branching	2,440	111 26	39	
Rosedale	" 20	103	57	Strong	12	Sided	6,400	111 26	42½	Slightly.
Olive	" 22	105	56	"	9½	"	3,600	111 26	39½	
King	" 15	98	58	"	10	Branching	2,280	110	39	
Black Beauty	" 19	102	57	Weak	12	"	4,600	109 14	37	
Kendal	" 25	108	40	Strong	11½	"	3,160	108 28	40	
Golden Giant	" 23	106	57	"	14	Sided	2,100	108 28	35	
Pense	" 23	106	52	"	13¼	"	4,820	107 22	39½	
Holland	" 21	104	62	"	15	"	4,840	105 10	35	
New Zealand	" 25	108	58	"	13	"	4,200	105 10	3[illegible]½	Slightly.
Pioneer	" 23	106	44	"	11½	Branching	4,180	104 24	38½	
Flying Scotchman	" 12	95	63	"	11¼	"	5,200	103 18	41	
Milford	" 23	106	58	"	14	Sided	3,600	102 32	38½	
Cromwell	" 22	105	61	"	13	"	3,560	102 12	40	
Hazlett's Seizure	" 12	95	54	Weak	12¾	Branching	3,460	101 26	42	
Golden Tartarian	" 20	103	59	Strong	12½	Sided	2,660	99 14	36½	Slightly.
Tartar King	" 22	105	58	"	13	"	4,060	98 28	42½	
Sensation	" 20	103	61	"	9½	Branching	4,000	97 22	42½	
Waverley	" 21	104	54	"	11¼	"	4,460	97 2	41¾	
White Schonen	" 14	97	53	Weak	11	"	4,160	97 2	43	
Salines	" 22	105	57	Strong	11	"	4,480	96 16	37½	
Cream Egyptian	" 11	94	58	"	12	"	2,840	96 16	44	
Miller	" 15	98	63	"	13	"	4,560	95 10	39	
Russell	" 19	102	58	"	12	"	4,360	95 10	40	Slightly.
Scotch Potato	" 23	106	63	"	11¾	"	5,620	94 24	37½	
Brandon	" 15	98	65	"	13	"	5,680	92 32	38½	
White Giant	" 15	98	57	"	10½	"	3,880	91 26	39	
Master	" 23	106	58	"	12	Sided	5,040	90 20	40	Slightly.
Black Mesdag	" 13	96	55	"	12	Branching	3,810	87 2	38¾	
Irish Victor	" 22	105	54	Medium	10½	"	3,240	87 2	40	
Longhoughton	" 26	109	55	Strong	11½	"	4,080	81 6	39	Slightly and
Oxford	" 21	104	58	"	10	"	4,080	80	41	smutty.
Bonanza	" 12	95	55	Medium	11	"	4,260	72 32	45	Very smutty



Scenes on Experimental Farm, Indian Head, N.W.T.

1. Fruiting branch of plum tree.
2. Indian corn in 1901.
3. Farm herd of cattle.
4. Wheat in stook, crop of 1901.

OATS—Fourteen Varieties Sown on Plots of ½ to 11 Acres.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of head.	Kind of Head.	Yield per Acre.
	Acres.				In.		In.		Bush. Lbs.
Abundance, on fallow	5	May 11.	Aug. 22.	103	56	Strong	10	Branching	124 20
Banner "	11⅕	" 11.	" 19.	100	59	"	11¼	"	117 ..
Tartar King "	3¼	" 8.	" 18.	102	61	"	10¾	Sided	104 10
Goldfinder "	1¼	" 8.	" 28.	112	62	Medium.	12	Branching	104 ..
New Zealand "	1⅕	" 15.	" 27.	104	58	Weak	12½	Sided	100 ..
Bavarian "	4½	" 9.	" 16.	99	61	Strong	10	Branching	99 4
Wide-awake "	6	" 8.	" 15.	99	59	"	10½	"	96 ..
Waverley "	3½	" 8.	" 19.	103	61	Medium.	10	"	94 ..
Black Beauty "	2/3	" 15.	" 19.	96	56	Weak	10½	"	93 ..
Thousand Dollar, on fallow	1	" 15.	" 23.	100	56	Strong	9	"	92 4
Banner, on prairie sod backsetting.	8	" 7.	" 12.	97	58	"	11	"	91 30
Lincoln, on fallow	½	" 15.	" 22.	99	57	"	11	"	91 2
Improved Ligowo, on fallow	5	" 8.	" 17.	101	62	Weak	12	"	83 ..
Early Archangel "	½	" 15.	" 22.	99	53	Strong	9½	"	76 14

TEST OF FORMALIN AS A PREVENTIVE OF SMUT IN OATS.

Sown on May 9, on 1-40th acre plots of fallowed land, by hoe-drill, at the rate of 2 bushels per acre.

Seed.	Condition.	Treatment.	On 25 sq. feet.	
			Good Heads.	Smutty Heads.
Banner	Clean	6 oz. formalin to 10 galls. water, soaked 1 hour	897	0
"	"	" " " 20 mins.	860	0
"	"	" " " 5 "	911	3
"	"	Untreated	870	23

COMPARATIVE TEST OF SELECTED AND WELL SCREENED OATS FOR SEED.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Bush. Lbs.	Lbs.
Banner, selected	Aug. 21	104	60	Strong	10½	Branching	4,760	130 20	41½
" well cleaned	" 21	104	61	"	11	"	5,720	122 12	42
" small seed	" 19	102	60	"	10½	"	5,540	120 20	44¾

The seed sown in the above test was procured in the same manner as that used in a similar test with wheat. Sown on May 9, on 1-20th acre plots of fallowed land, by hoe-drill, at the rate of one and one-half bushels per acre.

EXPERIMENTS WITH BARLEY.

Thirty varieties of 6-rowed and twenty-two varieties of 2-rowed Barley were tested on uniform plots of 1-20th acre each ; ten of the same varieties were sown on plots of ¼ to 5 acres, and Royal was used in the test of formalin as a preventive of smut.

The crop on the whole, was satisfactory, and some very large yields were obtained on the uniform test plots.

There was, unfortunately, considerable smut in some of the varieties, although all the seed had been treated with formalin.

TEST OF VARIETIES.

Thirty varieties of 6-rowed and twenty-two varieties of 2-rowed Barley were sown on May 14, on 1-20th acre plots of fallowed land, by hoe-drill, at the rate of 2 bushels per acre. All germinated evenly and well.

White and Black Hulless lodged badly, but all the other varieties were erect when cut.

SIX-ROWED SORTS.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Proportion Smutty.
			In.		In.	Lbs.	Bush	Lbs.	Lbs.	
Odessa	Aug. 15	93	43	Weak	3	4,000	68	36	50	
Mensury	" 14	92	46	Strong	3¼	3,780	67	4	49½	
Claude	" 11	89	41	"	3	3,300	66	12	50	
Royal	" 12	90	41	"	3	3,140	63	16	52	
Trooper	" 11	89	43	"	3	3,360	59	28	51½	
Petschora	" 10	88	37	"	3¼	3,380	59	8	49	
Brome	" 13	91	41	Medium	3	4,960	58	16	52	
Blue Long-head	" 21	99	38	Strong	3	2,320	57	4	48	
Mansfield	" 14	92	47	"	3	3,570	57	4	50	Slightly smutty.
Empire	" 15	93	46	Medium	3	3,900	56	32	50½	
Summit	" 21	99	43	Strong	3	4,200	56	12	52	
Nugent	" 22	100	44	"	3	4,490	55	40	52	"
Pioneer	" 20	98	47	"	3	2,920	54	8	53½	
Common	" 11	89	41	Medium	3	3,900	53	36	51	
Garfield	" 14	92	43	Strong	3¼	3,800	53	16	51½	
Oderbruch	" 7	85	44	Weak	3½	2,100	53	16	50	
Rennie's Improved	" 9	87	41	Strong	3	3,320	52	24	50½	
Stella	" 13	91	39	"	2¼	4,340	51	12	51½	
Baxter	" 9	87	39	"	2¼	3,700	50	..	51	A little smut.
Yale	" 14	92	45	"	2¾	4,570	48	36	49	
Champion	" 7	85	46	"	3¾	3,620	47	4	49	
Surprise	" 14	92	40	"	3	3,650	46	12	52½	"
Albert	" 10	88	36	"	2¼	3,580	45	40	52½	
Vanguard	" 9	87	40	"	3	2,760	45	40	50	"
Black Hulless	" 7	85	34	Medium	2½	3,480	45	40	63½	
Argyle	" 10	88	40	Strong	3	3,960	44	8	48½	
Success	" 7	85	39	"	3¼	2,980	41	12	49	
Phoenix	" 9	87	38	"	2¼	3,900	40	..	52	Smutty.
White Hulless	" 6	84	36	Weak	3¼	3,730	37	4	57	
Excelsior	" 5	83	38	Strong	4	2,780	35	..	49½	

TWO-ROWED SORTS.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Proportion Smutty.
			In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
Standwell	Aug. 23..	101	45	Strong....	3	3,020	67	44	52	Slightly smutty
Sidney	" 9..	87	44	" ...	3¾	6,100	61	32	53½	
Bolton	" 14..	92	52	Medium..	4¼	4,900	59	28	53	"
Kirby	" 14..	92	47	" ..	3¼	4,420	59	8	51¾	
Leslie	" 10..	88	45	" ..	3¼	3,910	58	36	53½	
Nepean	" 13..	91	52	Strong....	3¾	3,430	58	16	50½	
French Chevalier	" 24..	102	39	" ..	4½	3,740	57	44	51¾	
Harvey	" 5..	83	48	" ...	4¼	4,620	57	24	53½	
Jarvis	" 7..	85	49	" ...	5	5,270	57	4	51¾	
Danish Chevalier	" 24..	102	41	Weak	4¾	3,920	57	4	51	
Prize Prolific	" 24..	102	42	"	5	2,800	56	32	52	
Invincible	" 21..	99	47	Strong....	3¾	3,600	55	40	53½	
Kinver Chevalier	" 25..	103	38	Weak	4	2,720	55	40	51	
Newton	" 23..	101	43	Strong....	4¼	4,300	55	20	53	"
Logan	" 11..	89	50	" ...	3½	6,479	54	28	53½	"
Clifford	" 6..	84	47	" ...	3½	4,480	54	8	53	"
Gordon	" 10..	88	51	" ...	3	4,980	52	24	53	
Canadian Thorpe	" 22..	100	44	" ...	3½	3,580	50	40	53	
Fulton	" 10..	88	48	" ...	3	3,760	50	40	53	
Victor	" 14..	92	44	" ...	4	3,580	47	4	52½	
Dunham	" 8..	86	43	" ...	3	3,720	45	20	51½	A little smut.
Beaver	" 11..	89	40	" ...	4¼	2,920	36	32	49	

BARLEY—TEST OF VARIETIES ON PLOTS OF ¼ TO 5 ACRES.

Nine varieties were sown on fallow and one of the same varieties on Brome backsetting.

The fallow was a field of 24 acres ploughed 7 inches deep in May, 1900, and cultivated four times during the season.

The crop of straw was enormous, and Odessa lodged badly over the entire 5 acres; while others went down in spots.

Rennie's Improved and Common were affected by smut, which considerably decreased the yield of these two varieties.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
	Acres.				In.		In.		Bush.	Lbs.
Sidney, on fallow	5	May 14..	Aug. 15..	92	47	Medium..	4	2-rowed...	60	10
Mensury, on fallow	5	" 14..	" 10..	87	47	Strong....	2¾	6 " ..	59	40
Odessa, on fallow	5	" 13..	" 11..	89	43	Weak	3	6 " ..	58	40
Sidney, on Brome backsetting	4	" 16..	" 15..	90	46	Medium..	3¾	2 " ..	51	..
Invincible, on fallow	½	" 15..	" 22..	99	46	Strong....	3½	2 " ..	49	32
Rennie's Improved, on fallow	5	" 14..	" 8..	85	47	"	2¼	6 " ..	49	20
Trooper, on fallow	3	" 13..	" 7..	85	44	Medium..	2¾	6 " ..	48	16
Standwell, on fallow	½	" 15..	" 22..	99	43	"	3	2 " ..	48	16
Common, on fallow	1	" 14..	" 10..	87	43	"	2¾	6 " ..	48	..
Canadian Thorpe, on fallow	¼	" 15..	" 18..	95	44	Strong....	3¼	2 " ..	44	..

TEST OF FORMALIN AS A PREVENTIVE OF SMUT IN BARLEY.

Sown on May 14, on 1-20th acre plots of fallowed land, by hoe-drill, at the rate of 2 bushels per acre.

Seed.	Condition.	Treatment.	On 25 sq. feet.	
			Good Heads.	Smutty Heads.
Royal	Smutty	6 oz. formalin to 10 galls. water, soaked 1 hour	872	3
"	"	6 oz. formalin to 10 galls. water, soaked 20 mins.	783	20
"	"	6 oz. formalin to 10 galls. water, soaked 5 mins.	760	36
"	"	Untreated	630	241

WHEAT CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.	Total Yield.
Red Fife	Brome backsetting	1	45-50	45-50 bush.
"	Prairie sod, backset	1½	48	72 "
"	Stubble, fall ploughed	10	36-20	362 "
"	Fallow	3½	49	157 "
"	Rotation test	4½	.....	168-32 "
Preston	Fallow	5	54-54	274-30 "
"	Brome backsetting	4	45-45	183 "
Stanley	"	4	40-45	163 "
Wellman's Fife	Prairie sod, backset	4½	39-20	177 "
Percy	Stubble, fall ploughed	6¾	36-18	245 "
Huron	Fallow	⅝	45	27 "
White Russian	"	½	49-40	24-50 "
Red Fern	Brome backsetting	1⅖	45	75 "
		47 13/20		1974-42

Or an average of 41 bushels 40 lbs per acre.

OAT CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.	Total Yield.
Abundance	Fallow	5	124-20	623 bush.
Banner	"	11 1/9	117	1300 "
"	Prairie sod, backset	8	91-30	735 "
Wide-awake	Fallow	6	96	576 "
Bavarian	"	4½	99-4	446 "
Waverley	"	3½	94	329 "
Tartar King	"	3¼	104-10	339 "
Gold Finder	"	1¼	104	130 "
New Zealand	"	1⅕	100	120 "
Thousand Dollar	"	1	92-4	92-4 "
Early Archangel	"	½	76-14	38-7 "
Lincoln	"	⅖	91-12	45-18 "
Black Beauty	"	⅜	93	69-24 "
Improved Ligowo	"	¼	83	416 "
		51 5/9		5259-19

An average of 101 bushels 15 lbs per acre.

BARLEY CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.	Total Yield.
Odessa	Fallow	5	58-40	294-8 bush.
Mensury	"	5	59-40	299-8 "
Rennie's Improved	"	5	49-20	247-4 "
Sidney	"	5	60-10	301 "
Trooper	"	3	48-16	145 "
Common	"	1	48	48 "
Standwell	"	½	48-16	24-8 "
Invincible	"	½	49-32	24-40 "
Sidney	Brome sod, backset	4	51	204 "
		29½		1587-20

An average of 53 bushels 30 lbs per acre.

EXPERIMENTS WITH PEASE.

Fifty-seven varieties of pease were sown on 1-20th acre plots of fallowed land, on May 15, by hoe-drill, at the rate of 2 bushels small, 2½ bushels medium and 3½ bushels large pease per acre.

The growth was slow at first, but after the rains came it was abnormally heavy, and some excellent yields of very fine pease were secured.

PEASE—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
				Inches.	Inches.		Bush. Lbs.	Lbs
Oddfellow	Sept. 5	113	Strong	47	3	Large	66 .	65½
Pride	" 7	115	"	70	3	"	60 20	64
German White	Aug. 30	107	"	75	3¼	"	60 ..	63½
Paragon	Sept. 10	118	"	49	2	Medium	59 40	64
Daniel O'Rourke	Aug. 30	107	"	92	3	Small	59 ..	64½
Gregory	Sept. 5	113	"	49	3	Medium	58 40	63
White Wonder	Aug. 27	104	Weak	28	2¾	"	57 ..	63½
King	Sept. 1	109	Strong	79	3	Large	56 ..	63
Fenton	" 5	113	"	64	3¼	"	54 40	62½
Crown	" 6	114	Medium	44	2½	Small	54 20	64
Agnes	" 4	112	Strong	70	3	Large	53 40	62½
Golden Vine	" 7	115	"	50	2¼	Small	53 20	63½
Trilby	" 8	116	"	52	3	Large	53 ..	62½
Early Britain	" 8	116	"	50	2½	"	53 ..	60
Lanark	" 5	113	"	48	3	"	52 20	63
Elephant Blue	" 6	114	"	38	2	Medium	52 ..	62½
Kent	" 8	116	"	72	3½	Large	52 ..	63½
Macoun	" 11	119	"	52	2¼	"	51 20	62½
Large White Marrowfat	" 9	117	"	70	3	"	51 20	63½
Alma	" 8	116	"	56	2½	Medium	51 20	62½
Bruce	" 10	118	"	60	2¼	Large	51 20	62½
New Potter	" 8	116	"	57	3	"	51 ..	61½
Nelson	" 9	117	"	50	2¾	Medium	51 ..	65
Carleton	" 8	116	"	50	2½	"	50 40	62½
Prussian Blue	" 3	111	"	64	3	"	50 40	64½
Cooper	" 7	115	"	67	2½	"	50 40	63
Arthur	" 5	113	"	42	2¾	Large	50 20	64½
Black-eyed Marrowfat	" 6	114	"	48	3¼	"	50 20	63½
Elliot	" 10	118	"	48	2½	"	50 20	61½
Mummy	" 2	110	"	67	3	Medium	50 ..	62

PEASE—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
				Inches.	Inches.		Bush. Lbs.	Lbs
Chancellor	Aug. 30..	107	Weak	55	2	Small	50 ..	65
French Canner	Sept. 5..	113	Strong....	51	3	"	49 40	64
Prince	" 3..	111	"	61	3	Large	49 40	63
Canadian Beauty	" 8..	116	"	62	2½	"	49 40	64
Prince Albert	" 5..	113	"	52	2	"	49 20	63½
Dover	" 8..	116	"	48	2¼	"	49 ..	61⅓
Centennial	" 5..	113	"	52	2½	Small ...	49 ..	63
Perth	" 6..	114	"	68	3	Large	48 40	62¾
English Grey	" 4 .	112	"	42	3	"	48 20	62⅔
Archer	" 8..	116	"	48	2	Medium..	48 20	63½
Picton	" 1..	109	"	63	3	Large	48 ..	64
Creeper	" 6..	114	Weak	55	2	Small	47 40	64
Fergus	" 8..	116	Strong....	48	2¼	Large	47 ..	63
Vincent	" 8..	116	"	48	2¼	"	47 ..	62
Duke	" 8..	116	"	48	2½	"	46 40	64
Pearl	" 11..	119	"	54	2¼	"	46 20	62½
Harrison's Glory	" 10..	118	"	49	3	"	46 ..	64
Bright	" 12..	120	"	60	3	"	46 ..	62
Victoria	" 10..	118	"	49	3	"	45 20	63
Mackay	" 11..	119	"	52	2½	"	45 20	63
Wisconsin Blue	" 5..	113	"	38	2½	Small	44 20	63
Bedford	" 8..	116	"	42	2	Medium..	43 20	62½
Herald	" 5..	113	"	56	2	" ..	41 20	63
Multiplier	" 5..	113	"	58	2	Small	40 40	63
Elder	" 10..	118	"	48	2½	Medium..	40 20	62½
Chelsea	" 5..	113	"	49	2	Small	39 20	65⅓
Grass Pea	" 12..	120	"	53	1	"	36 ..	..

INDIAN CORN.

TEST OF VARIETIES.

Thirty-four varieties of Indian Corn were sown on May 22, in rows 36 inches apart, by grain-drill ; and for comparison, planted by hand in hills three feet apart each way, on the same date.

Both plots were cut for ensilage on September 2. The yield was computed from the weight of corn on two rows, each 66 feet long.

The land used for the test had been fallowed in 1900, and in the fall of that year twenty loads per acre of well-rotted manure was spread evenly over the ground. Before seeding in the spring this was gang-ploughed in, three inches deep, and the plots were well harrowed.

Before and after the corn came up the weeder was used, and until it was too high to permit the working of a horse, a scuffler was run at short intervals. No weeds were allowed to appear.

When cut for ensilage, on September 7, all varieties were well advanced, and the quality and quantity of the fodder is the best we have ever been able to secure here.

Name of Variety.	Character of Growth.	Height.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		Inches.		Tons.	Lbs.	Tons.	Lbs.
Early Mastodon	Very strong	138	Late milk	26	1,724	13	1,388
Pride of the North	"	101	"	26	800	21	32
Giant Prolific Ensilage	"	103	Tassel	25	1,480	16	1,792
Mammoth Cuban	"	117	Early milk.	24	388	19	1,600
Cloud's Early Yellow	"	107	Glazed	21	388	18	168
Salzer's All Gold	"	127	Late milk	24	180	20	1,920
Evergreen Sugar	"	113	"	23	1,784	21	264
Pearce's Prolific	Strong	96	"	23	1,520	17	848
Salzer's Superior Fodder	Very strong	133	Early milk.	23	860	17	848
Selected Leaming	"	102	Late milk	23	200	22	880
Country Gentleman	Strong	94	"	22	1,850	13	400
Angel of Midnight	"	99	"	22	1,408	18	1,456
Canada White Flint	Medium	98	Early milk.	22	200	17	848
Red Cob Ensilage	Very strong	100	"	22	180	16	1,792
Longfellow	"	131	"	21	1,560	21	240
Early Butler	"	124	Late milk	21	900	18	168
North Dakota White	Medium	92	Glazed	21	504	14	312
Mammoth Eight-rowed Flint	"	95	Early milk.	20	1,844	14	776
White Cap Yellow Dent	Very strong	114	"	20	920	16	1,264
Thoroughbred White Flint	"	94	Tassel	20	524	19	280
Compton's Early	Strong	99	Late milk	19	1,996	12	1,872
Yellow Six-weeks	Weak	77	Glazed	19	1,864	11	440
Champion White Pearl	Strong	95	Early milk.	19	1,600	16	1,752
Very Early August	Weak	83	Glazed	19	544	12	288
Extra Early Huron Dent	Very strong	117	"	19	544	15	1,416
North Dakota Yellow	Medium	98	Late milk	17	1,738	14	284
Ruby Mexican	"	103	"	17	640	11	1,552
Early Yellow Long-eared	Very strong	116	"	17	452	15	1,944
Kendall's Early Giant	Medium	82	"	17	188	15	1,680
Sanford	Strong	96	Early milk.	16	500	12	816
King of the Earliest	Medium	105	Late milk	16	200	17	320
Extra Early Szekely	Weak	92	"	13	1,324	9	1,800
Mitchell's Extra Early	"	75	Glazed	12	1,244	15	1,680
Salzer's Earliest Ripe	"	92	Late milk	12	1,080	11	704

INDIAN CORN.—Test of seeding at different distances sown in drills by grain seeder on May 22. Cut September 2. Cultivation of land the same as for preceding test.

Name of Variety.	Distance between rows.	Character of Growth.	Height.	Weight per Acre grown in rows.	
	Inches.		Inches.	Tons.	Lbs.
Champion White Pearl	21	Strong	116	21	300
"	28	"	116	12	842
"	35	"	116	18	1,968
"	42	"	117	17	686
Longfellow	21	"	113	26	640
"	28	"	125	23	1,940
"	35	Very strong	130	24	251
"	42	"	137	21	1,616
Selected Leaming	21	"	123	25	8
"	28	"	119	24	645
"	35	"	121	21	827
"	42	"	129	19	1,198

ROTATION OF CROPS.

The plan inaugurated in 1899 for a rotation of crops was followed out this year in a satisfactory manner.

No.	1899.	1900.	1901.
1	Wheat	Oats.	Soja Beans.
2	Wheat	Wheat	Pease.
3	Wheat	Oats.	Tares.
4	Wheat	Wheat	Red Clover
5	Wheat	Barley	Alsike and Lucerne.
6	Pease	Wheat	Wheat.
7	Tares	Wheat	Oats.
8	Soja Beans	Wheat	Oats
9	Red Clover	Wheat	Wheat.
10	Alsike and Lucerne	Wheat	Barley.
11	Rape	Wheat	Summer-fallow.
12	Wheat	Wheat	Summer-fallow.
13	Wheat	Oats.	Summer-fallow.
14	Wheat	Barley	Summer-fallow.
15	Wheat	Wheat	Oats.
16	Wheat	Barley.	Oats.
17	Oats.	Soja Beans	Wheat.
18	Wheat	Pease.	Wheat.
19	Oats.	Tares.	Wheat.
20	Wheat	Red Clover	Wheat.
21	Barley.	Alsike and Lucerne	Wheat.
22	Rye	Summer-fallow.	Wheat.

Results obtained in 1901. Soil, Clay Loam.

	Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
						In.		In.		Bush.	Lbs.
1	Soja Beans	½ acre	May 22			34	Ploughed under Aug. 21.				
2	Pease	"	" 16			60	"		July 26.		
3	Tares	"	" 16			28	"		" 10.		
4	Red Clover	"	" 16			16	"		Sept. 3.		
5	Clover, Alsike and Lucerne	"	" 16			30	"		" 3.		
6	Wheat, Red Fife	"	" 6	Aug. 26	112	54	Strong.	3¾	Bald.	38	52
7	Oats, Banner	"	" 6	" 15	101	51	"	10	Branch.	97	32
8	Oats, Banner	"	" 6	" 15	101	45	"	10	"	91	8
9	Wheat, Red Fife	"	" 6	" 26	112	54	"	4	Bald	38	..
10	Barley, Sidney	"	" 6	" 15	101	40	"	3	2-rowed.	50	36
11	Summer Fallow	"		Ploughed 7 inches deep on June 5, and cultivated 4 times during summer.							
12	" "	"					"		"		
13	" "	"					"		"		
14	" "	"					"		"		
15	Oats, Banner	"	May 6	Aug. 15	101	48	Strong.	10½	Branch.	80	26
16	Oats, Banner	"	May 6	" 15	101	50	"	10½	"	98	8
17	Wheat, Red Fife	"	" 6	" 26	112	54	"	4	Bald	43	44
18	" "	"	" 6	" 26	112	50	"	4	"	43	18
19	" "	"	" 6	" 26	112	51	"	3¾	"	43	2
20	" "	"	" 6	" 26	112	53	"	4	"	42	16
21	" "	"	" 6	" 26	112	52	"	4	"	43	12
22	" "	"	" 6	" 25	111	51	"	4	"	44	40

SUMMARY OF RESULTS FOR TWO YEARS.

Plot	Variety.	Yield per Acre.	Variety.	Yield per Acre.
	1900.	Bush. Lbs.	1901.	Bush. Lbs.
1	Oats, Banner	11 2	Soja Beans, ploughed under Aug. 21	
2	Wheat, Red Fife	4 20	Pease, " " July 26	
3	Oats, Banner	11	Tares, " " 10	
4	Wheat, Red Fife	5	Red Clover, " " Sept. 3	
5	Barley, Canadian Thorpe	9 44	Clover, Alsike and Lucerne. 5	
6	Wheat, Red Fife.	16 50	Wheat, Red Fife	38 52
7	Wheat, Red Fife	19 30	Oats, Banner	97 32
8	Wheat, Red Fife	18 20	Oats, Banner	91 8
9	Wheat, Red Fife	11 20	Wheat, Red Fife	38
10	Wheat, Red Fife	8 20	Barley, Sidney	50 36
11	Wheat, Red Fife	10 40	Summer Fallow, ploughed June 5	
12	Wheat, Red Fife	7 40	Summer Fallow, "	
13	Oats, Banner	9 14	Summer Fallow, "	
14	Barley, Canadian Thorpe	4 32	Summer Fallow, "	
15	Wheat, Red Fife	4 30	Oats, Banner	80 26
16	Barley, Canadian Thorpe	9 4	Oats, Banner	98 8
17	Soja Beans (Ploughed under.)	Aug. 3	Wheat, Red Fife.	43 44
18	Pease, Golden Vine (Ploughed under.)	July 28	Wheat, Red Fife	43 18
19	Tares (Ploughed under.)	"	Wheat, Red Fife	43 2
20	Clover, Common Red (Ploughed under.)	Sept. 10	Wheat, Red Fife	42 16
21	Clover, Alsike and Lucerne (Ploughed under.)	"	Wheat, Red Fife	43 12
22	Summer Fallow (Ploughed under.)		Wheat, Red Fife	44 40

EXPERIMENTS WITH FLAX.

Sowing different quantities of seed per acre and at different dates. Soil, Clay Loam, summer-fallowed. Sown by hoe-drill.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
	Acre.				Inches.	Lbs.	Bush. Lbs.	Lbs.
40 lbs. per acre	1/10	May 15	Aug. 15	92	30	2,480	18 12	56
80 "	1/10	" 15	" 15	92	30	2,680	17 38	55½
40 "	1/10	" 22	" 20	90	30	2,960	19 36	56
80 "	1/10	" 22	" 20	90	30	3,380	21 36	55¾
40 "	1/10	" 29	" 20	83	30	2,520	21 4	56
80 "	1/10	" 29	" 20	83	30	2,720	22 40	55¾

On account of the lateness of the season only three seedings were practicable.

Experiments with White Flax.

The experiment with White Flax, kindly sent for trial by Mr. Alfred Boyd, Toronto, Ontario, was continued this year, and although the season was very favourable for ordinary flax, the white variety was a complete failure. The straw did not grow over 6 inches high, and very little seed formed.

EXPERIMENTS WITH MILLETS.

Seven varieties were sown on May 23, on 1-20th acre plots of land fall-ploughed and manured.

Cut for feed on September 5.

Variety.	Length of Straw.	Length of Head.	Condition when cut.	Yield per Acre.
	Inches.	Inches.		Tons. Lbs.
Italian	41		Not in head	15 1,218
Cat-tail	40		"	15 492
Hungarian	44	4½	Headed	12 1,410
Japanese	47		Not in head	12 175
White Round French	56	9	Headed	9 690
German	33		Not in head	9 510
Pearl	25		"	7 520

EXPERIMENTS WITH RAPE.

Three varieties were sown on May 23, on 1-20th acre plots of fall-ploughing, manured.

Cut for feed on September 14.

Variety.	Length.	Yield per Acre.
	Inches.	Tons. Lbs.
Dwarf Essex	62	41 1,870
Broad Leafed	55	41 1,190
Dwarf Victoria	53	31 1,450

EXPERIMENTS WITH CANARY GRASS.

(*Phalaris canariensis*).

Sown May 15, on 1-20th acre plot of fallowed land, cut August 26; time of mature, 103 days.

Straw, strong ; 46 inches long.

Head, 1¾ inches long.

Weight of straw per acre, 3,060 lbs.

Yield per acre, 25 bushels 30 lbs.

EXPERIMENT WITH SUNFLOWERS.

Mammoth Russian was sown on May 22 ; frozen September 17 ; height, 12 feet.

Very few heads had matured before frost came, and the greater portion of the crop was lost.

EXPERIMENT WITH SPRING RYE.

Sown on May 14, on 1-40 acre lot of fallowed land.

Ripe August 22 ; time to mature, 100 days.

Straw, strong; 51 inches long.

Length of head, 4 inches. Yield per acre, 52 bushels and 8 pounds.

EXPERIMENT WITH SOJA BEANS.

Sown on May 22, on 1-20th acre plots of land manured and fall-ploughed. Cut September 14. No pods formed.

Variety.	Distance between Rows.	Height.	Yield per Acre (Green).
	Inches.	Inches.	Tons. Lbs
Soja Beans	21	38	7 1,550
"	28	39	6 936
"	35	38	6 1,605

EXPERIMENTS WITH HORSE BEANS.

Sown on May 22, on 1-20th acre plots of land manured and fall-ploughed. Cut September 14. The beans fully matured.

Variety.	Distance between Rows.	Length of Pod.	Height.	Yield per Acre (Green).
	Inches.	Inches.	Inches.	Tons. Lbs.
English Horse Beans	21	3	50	11 1,325
"	28	3	50	11 344
"	35	3	56	11 1,582

EXPERIMENT WITH TURKESTAN ALFALFA.

This seed was sown in the spring of 1900, in one of the garden-plots, and came through the winter in perfect condition.

Requiring the ground for Apple-trees, and not deeming the test a satisfactory one on account of the large amount of protection afforded the crop by the hedges, it was ploughed under in May. In spite, however, of the ploughing and other cultivation, many of the roots continued to grow during the summer, and produced a heavy crop of coarse feed, which the stock did not care for.

HAY CROP.

The crop of Hay secured from both Brome grass and Western Rye grass was very satisfactory.

On recent seedings the crop was above the average and old fields produced a fairly good yield. Part of the fields of Brome-grass and Western Rye-grass where snow had accumulated, gave large returns and brought up the average of some fields, portions of which were exposed to winds, and were consequently bare of snow during the whole winter.

A considerable acreage of both these grasses was left and cut for seed, which has been secured in good condition, free from foul seed of any sort.

One and three-quarter acres, cut for seed, August 3.

BROME GRASS (*Bromus inermis*).

1 acre, first crop, cut July 30 ; yield, 4 tons 1,980 pounds per acre.
10 acres, first crop, cut July 30 ; yield, 1 ton 1,780 pounds per acre.
6 acres, third crop, cut July 9 ; yield, 1 ton 435 pounds per acre.
14 acres, second crop, cut for seed July 31.

WESTERN RYE GRASS (*Agropyrum tenerum*).

Two and three-fifth acres, first crop, cut July 11 ; yield, 4 tons 500 pounds per acre.

Three and a half acres, fifth crop, cut July 23. (Manured spring 1901). Yield, 4 tons per acre.

One and three-quarter acres, cut for seed, August 3.

MIXTURE.

Five acres, mixed Brome and Western Rye grass, first crop, cut July 23 ; yield, 2 tons 360 pounds per acre.

NEW SEEDINGS (1901).

Fifteen and three-quarter acres Brome grass, sown June 19.
Eleven and three-quarter acres Western Rye grass, sown June 18.
One and one-quarter acres Western Rye grass, sown May 25.

SEEDING AND CULTIVATION OF BROME GRASS.

For information regarding the seeding and cultivation of Brome grass the following is quoted from the report of 1896 :—

'This grass is better sown alone ; at least it should not be sown with a grain crop. The grain takes too much moisture from the young grass-plants, only the most vigorous of which will survive the dry weather in September ; whereas, if sown alone all the plants have an equal chance.

'It is advisable to sow the seed on land that does not blow. Summer-fallow would be the best preparation, but on account of its liability to drift it is not safe in many parts of the Territories to use this kind of land. Stubble-land ploughed three or four inches deep in April or May, and well harrowed after the seed is sown is found to be quite safe from winds, as the stubble harrowed to the top prevents all drifting.

'Ten or twelve pounds of seed is required per acre. More seed will give a better crop the first year, but less afterwards, as the roots thicken up each year, and in three or four years this grass makes better pasture than hay.

'The seed being light, long and thin, seeding by hand is the only practicable method unless seeders constructed for the purpose are available. To seed properly a calm day should be chosen, so that all parts of the land may be evenly sown.

'While the plants are young, weeds are sure to make great headway, and it is necessary to keep them at least from going to seed. The quickest way to accomplish this is to go over the field with a mower, cutting just above the grass plants. If this operation has to be repeated it will be necessary to cut the tops of the grass, but this will not injure the plants, in fact it is an advantage in the way of giving the roots a firmer hold.

'The first crop of hay can be cut the next year after seeding, and will, in ordinary years, be ready early in July. Twenty days after being ready to cut for hay it will be fit to cut for seed if so desired.

'On this farm it has always been cut in first bloom for hay, and twenty days from this time it is considered in proper condition to cut for seed.

'In cutting for seed, a binder is used and the grass is cut, tied and stooked the same as wheat or other grain. In a week or ten days after cutting it is ready to thresh or store away.

'For threshing small quantities, the old-fashioned flail is suitable, but for large lots a threshing machine should be used on which the wind has been shut off as much as practicable. From three to six hundred pounds of seed may be expected from an acre.'

EXPERIMENTS WITH FIELD ROOTS.

The land for all the field roots, including potatoes, was fallowed in 1900 by one deep ploughing and several surface cultivations to keep down weeds. In the fall after the ground was frozen, twenty loads per acre of well-rotted manure was spread evenly over the field and before seeding in the spring was ploughed in three inches deep and well harrowed. Frequent cultivation during the growing season was given all the roots.

The yield was computed from the weight of two rows 66 feet long and 30 inches apart.

EXPERIMENTS WITH TURNIPS.

A dry period ensued after the seed was sown and the second seeding did not germinate until after the rains on June 12. The catch of both seedings was very even, but after thinning, the turnip fly did considerable injury to the leaf on the first seeding, which was several weeks earlier than the second. No set-back took place after the second hoeing, and the weather being favourable for growth, a good crop of very fine roots was secured. The soil was clay loam, and twenty-nine varieties were tested. The first sowing was on May 21, the second on May 29, and all were pulled on October 11.

TURNIPS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Monarch	41	104	1,368	24	28	364	939	24
Perfection Swede	39	144	1,302	24	32	944	1,082	24
Selected Purple-top	37	1,900	1,265	..	26	140	869	..
Webb's New Renown	35	1,808	1,196	48	30	1,908	1,031	48
Sutton's Champion	34	1,696	1,161	36	27	1,308	921	48
Shamrock Purple-top	34	1,300	1,155	..	29	1,796	996	36
Prize Winner	33	1,452	1,124	12	26	932	882	12
Selected Champion	33	....	1,100	..	25	952	849	12
Magnum Bonum	33	....	1,100	..	28	1,156	952	36
Hall's Westbury	32	584	1,075	48	24	840	814	..
Halewood's Bronze-top	31	436	1,040	36	15	1,896	531	36
Hartley's Bronze	30	1,116	1,018	36	21	1,560	726	..
Prize Purple-top	30	192	1,003	12	36	72	1,201	12
Elephant's Master	29	344	972	24	24	1,500	825	..
Emperor Swede	28	1,948	965	48	22	1,540	759	..
Skirving's	28	1,288	954	48	27	120	902	..
Kangaroo	28	760	946	..	24	1,632	927	12
West Norfolk Red-top	28	496	941	36	20	1,976	699	36
Imperial Swede	28	232	937	12	26	536	875	36
Champion Purple-top	25	1,744	862	24	20	1,844	697	24
Mammoth Clyde	25	688	844	48	24	576	809	36
Giant King	25	160	836	..	16	1,132	552	12
East Lothian	24	972	816	12	20	1,316	688	36
Jumbo	23	1,265	787	36	19	280	638	..
Marquis of Lorne	23	992	783	12	23	1,124	785	24
Bangholm Selected	22	1,804	763	24	27	1,532	925	32
Carter's Elephant	22	352	739	12	14	1,436	490	36
Drummond Purple-top	21	360	706	..	15	1,680	528	..
New Arctic	20	1,976	699	36	25	1,480	858	..

EXPERIMENTS WITH MANGELS.

As with the turnips the second seeding did not germinate until after the rains on June 12. Except on high places in the field, too much rain kept the soil cold and none of the varieties made much progress until the month of August.

The roots were sound and fine and afford a large amount of feed.

Twenty-five varieties were tested, sown on clay loam. Two sowings were made in each case, the first on May 22, the second on May 29, and all were pulled on October 1.

MANGELS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Prize Mammoth Long Red	30	1,380	1,023	..	29	740	979	..
Ward's Long Oval-shaped	29	740	978	..	21	1,560	726	..
Canadian Giant	28	1,948	965	48	18	168	602	48
Prize-winner Yellow Globe	27	1,208	928	..	29	80	968	..
Lion Yellow Intermediate	27	912	915	12	27	1,572	924	12
Half-long Sugar Rosy	27	780	913	..	24	180	803	..
Selected Mammoth Long Red	26	1,856	897	36	28	1,816	963	36
Mammoth Yellow Intermediate	26	1,328	888	48	22	880	748	..
Giant Yellow Half-long	26	308	871	48	24	576	809	36
Giant Yellow Intermediate	25	952	849	12	22	1,936	765	36
Triumph Yellow Globe	25	292	838	12	24	444	807	24
Giant Yellow Globe	25	28	853	48	26	992	883	12
Half-long Sugar White	24	1,368	822	48	27	384	906	24
Gate-post	24	972	816	12	17	1,940	599	..
Norbiton Giant	24	972	816	12	21	504	708	24
Champion Yellow Globe	23	1,520	792	..	22	1,804	763	24
Leviathan Long Red	23	1,124	785	24	17	1,640	594	..
Yellow Intermediate	23	728	778	48	25	1,612	860	12
Mammoth Oval-shaped	23	332	772	12	28	1,552	959	12
Yellow Fleshed Tankard	22	1,672	761	12	19	1,864	664	24
Mammoth Long Red	21	1,824	730	24	19	1,336	655	36
Gate-post Yellow	20	1,448	690	48	18	960	616	..
Golden Fleshed Tankard	19	940	649	..	22	1,012	750	12
Warden Orange Globe	19	16	633	36	24	708	811	48
Red Fleshed Tankard	*10	1,648	360	48	8	236	270	26

* Did not germinate well.

EXPERIMENTS WITH CARROTS.

Neither of the seedings germinated until about the end of June, and in consequence the season of growth was not sufficiently long to produce a heavy crop, although the yield was much higher than was at one time thought possible.

All varieties of field roots were sown by drill on the flat, on clay loam soil. Twenty varieties of carrots were tested. The sowings were made in each case, the first on May 22, the second on May 29, and all were pulled on October 1.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	lbs.	Bush.	lbs.	Tons.	lbs.	Bush.	lbs.
Ontario Champion	12	1,740	429	..	11	572	376	12
New White Intermediate	12	1,608	426	48	11	1,760	396	..
Half Long White	12	1,344	422	24	6	1,860	231	..
Iverson's Champion	12	1,212	420	12	10	592	343	12
White Belgian	12	816	413	36	11	1,668	394	28
Half Long Chantenay	12	816	413	36	8	1,688	294	48
White Vosges, Large Short	12	552	409	12	10	1,252	354	12
Mammoth White Intermediate	12	420	407	..	6	1,728	228	48
Green Top White Orthe	11	1,636	394	28	8	896	281	36
Improved Short White	11	1,232	387	12	12	1,080	418	..
Long Yellow Stump Rooted	11	968	382	48	10	1,780	363	..
Guerande or Ox-Heart	9	1,932	332	12	6	1,200	220	..
Yellow Intermediate	9	1,932	332	12	8	1,424	290	24
Scarlet Intermediate	9	1,400	323	20	9	216	203	36
Carter's Orange Giant	9	1,008	316	48	6	1,728	228	48
Giant White Vosges	8	1,744	295	44	8	1,952	299	12
Early Gem	7	1,312	252	12	7	652	244	12
Long Scarlet Altringham	7	784	246	24	5	448	174	8
Scarlet Nantes	7	388	239	48	6	1,464	224	24
Long Orange or Surrey	5	1,616	193	36	4	1,504	158	24

EXPERIMENTS WITH SUGAR BEETS.

Seven varieties of sugar beets were tested, all on clay loam soil, sown by drill on the flat. Two sowings were made in each case, the first on May 22, the second on May 29, and all were pulled on October 2.

SUGAR BEETS.—Test of Varieties.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Royal Giant	29	1,664	991	24	26	8	866	48
Improved Imperial	27	1,440	924		20	1,844	697	24
Red Top Sugar	27	912	915	12	25	1,348	855	48
Danish Red Top	24	1,896	831	36	25	1,744	862	24
Danish Improved	18	1,784	629	44	23	860	781	
Wanzleben	16	1,396	556	36	19	1,600	660	
Vilmorin's Improved	16	624	543	24	16	472	541	12

EXPERIMENTS WITH POTATOES.

Eighty-nine varieties of potatoes were planted in drills 30 inches apart, in which the sets were dropped 14 inches apart. The seed potatoes were kept in bushel boxes in a cool cellar during the winter. Large sets with two eyes each were used and planted after being cut four days. When planted and when tops were appearing, the ground was well harrowed and afterwards scruffled until the stalks were too large to permit of this work.

The yield was computed from the weight of potatoes in one row, 132 feet long.

A few of the early varieties did not germinate evenly and the yield was poor. The medium early potatoes have given the best returns for the past two years. There was no rot in any of the varieties.

The cultivation of the land before planting was the same as for field roots. They were planted on May 20, on clay loam, and dug October 3.

Name of Variety.	Character of Growth.	Average Size.	Total Yield per Acre.		Yield per acre, of Market-able.		Yield per acre, of Un-market-able.		Form and Colour
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Carman No. 1	Strong	Large	663	28	646	24	17	4	Oval, white.
Green Mountain	"	"	657	4	635	44	21	20	Long, "
Maggie Murphy	"	Very large	644	16	629	20	14	56	Long, dark red.
Carman No. 3	"	"	629	20	614	24	14	56	Oval, white.
Northern Spy	"	"	616	32	597	20	19	12	Long, dark red.
Rural Blush	Very strong	"	615	..	604	20	10	40	Oval, red.
General Gordon	Medium	"	612	16	597	20	14	56	" pink.
Country Gentleman	Weak	Large	610	8	567	28	42	40	Long, "
Delaware	Strong	Very large	603	44	582	24	21	20	Oval, white.
American Giant	Very strong	"	599	52	576	24	23	28	Long, white.
American Wonder	"	Large	599	28	573	52	25	36	Oval, white.
Dakota Red	"	Very large	595	12	580	16	14	56	Oval, dark red.
New Variety, No. 1	"	"	590	56	582	24	8	32	" white.
Burnaby Seedling	Strong	"	584	32	554	40	29	52	Long, light red.
Irish Daisy	Very strong	Large	582	24	548	16	34	8	Oval, white.
State of Maine	"	"	579	8	548	16	29	52	"
Dreer's Standard	Strong	"	576	..	554	40	21	20	"
Chicago Market	Medium	Very large	573	52	539	44	34	8	"
Rose, No. 9	Very strong	"	571	44	548	16	23	28	Oval, dark red.
Seedling, No. 230	Medium	Large	569	36	539	44	29	52	Oval, white.
Uncle Sam	Very strong	Very large	567	28	544	..	23	28	"
Quaker City	"	"	567	28	544	..	23	28	"
Late Puritan	"	"	556	48	533	20	23	28	Long, white.
Columbus	Strong	"	556	48	535	28	21	20	Oval, pink.
Clay Rose	Very strong	Large	548	16	533	20	14	56	" red.
Swiss Snow-flake	Weak	Medium	548	16	507	44	40	32	" white.
Great Divide	Very strong	Large	548	16	529	4	19	12	Long, red.
Cambridge Russet	Strong	"	546	8	524	48	21	20	" russet.
Lizzie's Pride	"	"	541	52	520	32	21	20	Oval, white.
Penn Manor	"	"	531	12	468	24	44	48	Long, light red.
Holborn Abundance	Very strong	Very large	531	12	512	..	19	12	Round, white.
Bill Nye	Strong	"	526	56	499	12	27	44	Long, white.
I. X. L.	Very strong	"	526	56	499	12	27	44	" light pink.
Empire State	"	"	524	48	503	28	21	20	" white.
Canadian Beauty	Strong	Medium	520	40	486	24	34	8	" pink.
Seattle	Very strong	Large	520	32	486	24	34	8	" white.
Early Sunrise	Weak	"	505	36	471	28	34	8	" pink.
Seedling No. 7	Very strong	"	505	36	482	8	23	28	Oval, red.
Flemish Beauty	Strong	Medium	499	12	471	28	27	44	Long, dark red.
Money Maker	Medium	Large	497	4	469	20	27	44	" white.
Pearce's Prize-winner	Very strong	"	492	48	458	40	34	8	" "
Sharpe's Seedling	"	"	486	24	439	28	46	56	" pink.
Irish Cobbler	Strong	"	486	24	456	32	29	52	Oval, red.
Troy Seedling	"	"	482	8	458	40	23	28	" white.
Sabean's Elephant	"	Small	480	..	462	56	17	4	Long, white.
Early Michigan	Weak	Small	480	..	420	16	59	44	Long, white.
Hale's Champion	Very strong	Large	477	52	448	..	29	52	Oval, white.
Prize Taker	Strong	"	477	52	454	24	23	28	Long, dark pink.
Reading Giant	Very strong	"	475	44	439	28	36	16	Oval, red.
New Queen	Strong	Very large	458	40	437	20	21	20	Long, red.
Pride of the Market	Weak	Large	458	40	437	20	21	20	Oval, white.
White Beauty	Strong	Medium	443	44	405	20	38	24	" "
Early Harvest	Weak	Very large	437	20	422	24	14	56	Long, white.
Brownell's Winner	Strong	Large	433	4	418	8	14	56	" red.
Polaris	Very strong	Medium	433	4	398	56	34	8	Oval, white.
Beauty of Hebron	Strong	Large	430	56	407	28	23	28	" pink.
Early St. George	Weak	Small	428	48	384	.	44	48	Long, pink.
Houlton Rose	Strong	Very large	428	48	422	24	6	24	" red.

Name of Variety.	Character of Growth.	Average Size.	Total Yield per Acre.		Yield per acre of Market-able.		Yield per acre of Un-market-able.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Bovee	Medium	Medium	416	..	369	4	46	56	Oval, pink.
Reeve's Rose	Strong	"	405	20	375	28	29	52	Long, red.
Sir Walter Raleigh	Very strong	Very large	398	56	390	24	8	32	Oval, white.
Lee's Favourite	Strong	Large	396	48	377	36	19	12	Long, red.
Brown's Rot-proof	Medium	Medium	396	48	371	12	25	36	Oval, dark red.
Early Six weeks	Weak	"	392	32	371	12	21	20	" pink.
McIntyre	Strong	"	392	32	379	44	12	48	Long, blue.
Thorburn	Weak	"	392	32	366	56	25	36	Oval, pink.
Early White Prize	"	"	390	24	352	..	28	24	Long, white.
Rochester Rose	Very strong	"	390	24	364	48	25	36	" red.
Pearce's Extra Early	Weak	Strong	379	44	334	56	44	48	Oval, pink.
Early Norther	Very strong	Very large	375	28	371	12	4	16	Long, dark pink.
Enormous	"	Large	373	20	362	40	10	40	Oval, white.
Earliest of All	Strong	Very large	371	12	366	56	4	16	Long, pink.
Vanier	Very strong	"	369	4	360	32	8	32	Oval, dark red.
Prolific Rose	"	Medium	366	56	337	4	29	52	Long, dark pink.
Early Ohio	Weak	Large	362	40	354	8	8	32	Oval, pink.
Daisy	"	Medium	334	56	302	56	32	..	Long "
Rural, No. 2	Very strong	Very large	315	44	309	20	6	24	Oval, white.
Maule's Thoroughbred	"	Medium	311	28	285	52	25	36	Long, red.
Rawdon Rose	Weak	Small	309	20	281	36	27	44	" pink.
Ohio Junior	"	Medium	300	48	277	20	23	28	Oval "
Early Market	"	Small	398	40	264	32	34	8	" "
Vick's Extra Early	Strong	Large	292	16	279	28	12	48	Long "
Burpee's Extra Early	Weak	Medium	292	16	270	56	21	20	Oval "
Everett	Very strong	Very large	281	36	277	20	4	16	Long, red.
Wonder of the World	Medium	Small	268	48	232	32	36	16	Oval, pink.
Early Andes	Weak	Medium	260	16	232	32	27	44	" "
Early Rose	Medium	Large	243	12	228	16	14	56	Long, red.
Early Puritan	Weak	"	177	4	174	56	2	8	" white.

THE VEGETABLE GARDEN.

The past season was satisfactory for most of the varieties of Vegetables. Beets, Carrots, Celery, Onions, Pease, Beans and Parsnips were exceptionally good; while Cabbage, Cauliflowers and Tomatoes did fairly well. Marrows, Squash, Pumpkins and things of this nature set a very light crop, but some very fair sized fruit was produced.

Asparagus.

On account of the dry weather early in the season, the crop of Asparagus was very light till rains came in June.

Conover's Colossal—In use May 17 to July 15

Barr's Elmira—In use May 17 to July 25.

Barr's Mammoth—In use May 17 to July 25.

BEANS.—Sown in open, May 9.

Variety.	Green, In use.	Ripe.	Remarks.
Imported Seed.			
Black Speckled	July 31	Sept. 12	Good cropper; late.
Fame of Vitry	" 21	" 5	" "
Canadian Wonder	Aug. 1	" 12	" "
Dwarf Emperor of Russia	July 21	Aug. 25	" early.
Dwarf Extra Early	" 19	" 17	" "
Experimental Farm Seed.			
Detroit Wax	July 19	Aug. 29	Good cropper; early.
Dwarf Kidney	" 19	" 20	" "
Currie's Rust-proof	" 15	" 17	" very early.
Stringless Wax	" 15	" 20	" early.
Early Six-weeks	" 21	" 17	Light crop; early.
Little Giant	" 26	" 17	The best; early.
Challenge Black Wax	" 15	" 20	One of the best; early.
Golden Wax	" 19	.....	Good green; did not ripen.
Dwarf Triumph	" 19	Aug. 29	Good cropper; early.
Red German Wax	" 26	.....	Light crop; did not ripen.
Flageolet Scarlet Wax	" 26	Sept. 10	Fair cropper; late.
Snow-pod	Aug. 1	.....	Light crop; did not ripen.
Early Mohawk	July 19	Aug. 20	Early green; fair cropper.

BEETS.—Sown May 2. Pulled October 1.

Variety.	In use.	Bushels per Acre.	Remarks.
		Bush.	
Long Smooth Blood Red	July 16	627	Large; good shape.
Early Blood Red Turnip	" 22	528	Large; good shape and colour.
Nutting's Dwarf Improved	" 16	475	Large; coarse.
Egyptian	" 25	331	Good shape and colour; the best.
Dell's Black Leaf	" 15	286	Large; bad shape.

BROCOLI.—Sown in hot-house, March 28. Transplanted April 19.

Variety.	In use.	Weight.	Remarks.
		Lbs.	
Extra Early White	July 20	7	Good and solid.
Large White Mammoth	" 20	5	"

BRUSSELS SPROUTS.

Brussels Sprouts, Improved Extra, Half-dwarf Paris Market and Dwarf Improved, sown in hot-house March 27. Transplanted April 19. Set out May 20.

On account of dry weather early in the season, the plants were stunted and no sprouts formed.

GARDEN CORN.—Planted May 20.

Variety.	Green, In use.	Ripe.	Remarks.
Mitchell's Extra Early	Aug. 17	Sept. 15	Good crop; some fine ears.
Extra Early Cory	" 17	" 15	" "
First of All	" 17	" 15	"
Adam's Extra Early	" 20	" 15	"
Crosby's Early Sugar	" 20	.....	Did not ripen.
Early Minnesota	.....	.....	"
Mammoth White Cory	Aug. 20	Sept. 15	Late; very little ripened.
Canada Yellow	" 16	" 10	Good table corn.
Squaw	" 17	" 5	Early; good crop.
Early Giant, 1900	" 25	.....	Did not ripen.
Early White Cory, 1900	" 20	Sept. 15	Fair crop.
First of All, 1900	" 17	" 15	"

CARROTS.—Sown April 25. Taken up, October 2.

Variety.	In use.	Bushels per Acre.	Remarks.
		Bush.	
Parisian Forcing	July 21	251	Large; good shape.
French Horn	" 21	322	Small "
Luc Half-long	" 28	412	Short; good root.
Long Blood Red	" 25	421	Smooth; good shape.
Chantenay, 1900	" 21	421	Large, smooth; good shape.
Scarlet Nantes, 1900	" 21	358	Small " "

CABBAGE.—Sown in hot-house, March 28. Transplanted to cold-frame, April 15. Set out in open, May 20. Taken up, October 6.

Variety.	In use.	Weight.	Remarks.
		Lbs.	
Express	August 6	6	Very fine heads.
Paris Market	" 2	6	Good heads.
Flat Parisian	" 6	10	"
Winningstadt Early	" 6	7	"
Drumhead St. John's Day	July 19	9	Very early, good heads.
Fottler's Improved Brunswick	August 6	10	Good heads.
Early Jersey Wakefield	July 19	7	Very early, fair heads.
Very Early Etampes	" 19	7	" "
Large Red Drumhead	August 10	15	Late, very fine heads.
Red Polish Short Stem	" 10	13	" "
Green Globe Savoy	" 6	8	Soft.

CAULIFLOWER.—Sown in hot-house, March 27. Transplanted to cold-frame, April 15. Set out in open, May 20.

Variety.	In use.	Weight.	Remarks.
		Lbs.	
Early Snow-ball	July 19..	6	Fine heads.
Extra Selected Earliest Erfurt	" 21..	6	Very fine heads.
Extra Early Paris	.....	.....	Did not germinate.
Chambourcy Mammoth	July 19..	8	Large, solid heads.
Large Algiers	" 19..	7	"
Autumn Giant	August 2..	7½	"
Autumn King, 1900	" 2..	7	"
Half Early Paris	.....	.....	Did not germinate.

CUCUMBERS.—Planted in hot-house, April 4 ; re-potted, April 21. Set out in open, May 17.

Variety.	In use.	Remarks.
Improved Long Green	July 30..	Light crop. Small.
English Favourite	" 25..	" "
Short Green Gerkin	" 10..	" "
Early Frame	" 20..	Fair crop. Small.
Giant Pera	" 20..	Good crop. Large fruit. Best.

CELERY.—Sown in hot-house, March 27 ; transplanted, April 22. Set out in trenches, June, 3 ; taken up, October 7.

Variety.	In use.	Height.	Weight.	Remarks.
		Inches.	Pounds.	
Giant Pascal	October 7..	30	3½	Large coarse.
Paris Golden Yellow	" 7..	18	3	Very fine heads.
Rose-ribbed Paris	" 7..	24	2½	"
Red Large-ribbed	" 7..	24	2	"
White Plume	August 27..	24	2	Excellent quality, small.
Giant Golden-heart	October 7..	36	4	" large.
Pink Plume	August 31..	30	2½	" small.
White Walnut	" 31..	24	3	"
New Triumph	October 7..	24	3	"

LETTUCE.—First seeding, April 30 ; in use, May 30 ; second seeding, May 30 ; in use, June 25.

Variety.	Heads.	Remarks.
Spring Cabbage Varieties.		
Forcing Milly	Large	Good.
White Tennis-ball	Small	Very fine.
Wheeler's Tom Thumb	"	"
Red Edged Victoria	"	Good.
Summer Sorts.		
Algiers	Large	Very fine.
All the year round, black seed	"	Good.
All the year round, white seed	Medium	"
White Marvel of Cazard	"	"
Blonde Stone-head	Small	"
Brown Stone-head	Large	"
Early Ohio or Nonpareil	"	"
Neapolitan	Small	"
Marvel or Red Besson	Medium	"
Big Boston	Large	Very fine.
Hammersmith	"	Good.
Hardy Red Winter	Medium	"
Cos.		
Green Paris	Large	Very fine.
White Paris	"	"

ONIONS.—Sown in open, April 25. Sown in hot-house, April 8. Transplanted, May 30. Lifted, September 12.

Variety.	Yield, Sown in Open.	Yield, Transplanted.	Remarks.
	Bush.	Bush.	
Trebons	403	384	Good variety ; large, solid.
Straw-coloured White Spanish	403	304	Large, solid.
Wethersfield, Large Red	313	242	"
Blood Red	286	242	"
Paris Silver-skin	233	120	Good pickling.
White Dutch	233	130	Good bulbs.
James' Keeping	206	161	Small, solid.
Market Favourite Keeping	175	108	Small ; very good.
Danver's Yellow Globe	175	153	Good bulbs.

MELONS.

Musk.—Dominion Green-flesh and Early Hackensack ; sown in hot-house, April 4 ; transplanted, April 21 ; set out, May 17. Light crop set and none ripened.

Water.—Stoke's Extra Early ; McIver's Sugar and South Dakota ; sown in hot-house, April 4 ; transplanted, April 21 ; set out, May 17. Light crop set and none ripened.

PEASE.—Sown May 8.

Variety.	In Use.	Ripe.	Size.	Remarks.
American Wonder	July 9	July 30	Small	Light crop.
Admiral	" 21	Aug. 16	"	Good crop.
Anticipation	" 28	" 26	Large	"
Alaska	" 9	July 30	Small	Light crop.
Burpee's Profusion	" 28	Aug. 25	Medium	Good crop.
Premium Gem	" 21	" 30	"	"
C. P. R.	" 31	Sept. 10	Large	"
Champion of England	" 31	Aug. 25	"	"
Daisy				Seed did not germinate.
Ever-bearing	July 21	Aug. 25	Medium	Good crop.
Extra Early	" 9	July 30	Small	Light crop.
First of All	" 9	" 30	"	Good crop.
Gradus	" 15	Aug. 25	Large	"
Horsford's Market Garden	" 23	" 25	Medium	"
Heroine				Seed did not germinate.
Laxton's Charmer	July 21	Aug. 16	Large	Good crop.
Nott's Excelsior	" 9	July 30	Small	"
Stratagem	" 31	Sept. 6	Large	"
Shropshire Hero	" 21	" 5	Medium	"
Prince of Wales	" 21	" 5	"	"
Queen	" 31	" 20	Large	"
Rural New Yorker	" 12	Aug. 5	Small	Light crop.
Telephone	" 26	" 30	Large	Good crop.
Yorkshire Hero	" 23	Sept. 25	Medium	"
First and Best	" 9	July 30	Small	"
Wm. Hurst	" 9	" 30	"	Light crop.

SQUASH AND MARROWS.—Sown in hot-house, April 13 ; transplanted, April 22 ; set out, May 17.

Variety.	Weight.	Crop.	Remarks.
	Lbs.		
Yellow Bush	12½	Good	Very fine fruit.
White Bush	8	Medium	" "
Mammoth Whale			Seed blown out.
Mammoth Red Hubbard	9	Good	Small, good fruit.
Crookneck	8	Medium	Large and soft.
Long White Bush	8	Good	" "
Vegetable Marrow	7½	"	" "

TURNIPS.—Sown, May 20 ; in use, July 21 ; pulled, October 7.

Variety.	Per Acre.	Remarks.
	Bush.	
Extra Early White Milan	735	Coarse, bad shape.
Early White Strap-leafed	645	Bad shape.
Half-long White Vertus	645	Good variety.
Yellow Golden Ball	592	"
Early Stone	511	"

TOMATOES.—Sown in hot-house, March 28 ; transplanted, April 19 ; set out, May 17.

Variety.	Green Fruit.	Ripe.	Size.	Remarks.
Dwarf Champion	July 10..	Sept. 1..	Small.....	Late, rough.
Imperial	" 19..	Aug. 25..	Large ...	Rough.
Early Michigan	" 10..	" 20..	Small.....	Smooth.
New Stone	" 15..	Sept. 1..	Large	"
Early Acme	" 10..	Aug. 26..	"	Rough.
Peach	" 20..	" 28..	Small. ..	"
Atlantic Prize	" 10..	" 28..	"	Smooth.
Extra Early Red	" 15..	" 20..	"	"
Canada	" 15..	Sept. 1..	Medium..	"
Early Ruby	" 10..	Aug. 20..	Small.....	Rough.
Earliest of All	" 10..	" 20 ..	Medium..	"
Red Cherry	" 20..	" 30..	Small.....	Smooth.
Yellow Plum	" 20..	" 30..	"	"
Ponderosa	" 20..	Sept. 1..	Large	"

CITRONS.

Sown in hot-house, April 4 ; transplanted, April 21 ; set out, May 17.
Red Seeded.—Weight, 8 pounds ; crop, fair ; small, even-sized fruit.
Preserving.—Weight, 5 pounds ; crop, fair ; small, even-sized fruit.

PUMPKINS.

Sown in hot-house, April 13 ; transplanted, April 22 ; set out, May 17.
Connecticut Field.—Weight, 41 pounds ; crop, good ; large, fine fruit.
Winter Surrey.—Weight, 35 pounds ; crop, good ; large, fine fruit.

PARSNIPS.

Sown, April 25 ; in use, October 1 ; taken up, October 1.
Hollow Crown.—233 bushels per acre ; large, fine roots.
Elcomb's Giant.—144 bushels per acre ; large, fine roots.

PEPPERS.

Large Red.—Sown March 28 ; fair crop, but did not ripen.

RADISHES.

First seeding, April 30 ; in use, May 25. Second seeding, May 30 ; in use, June 20.

Forcing Varieties.

Turnip Scarlet ; good variety.
Scarlet White Tipped ; good variety.
Deep Scarlet ; good variety.
Deep Scarlet Short-leaf ; good variety.

Turnip Varieties.

Early Scarlet, Early Scarlet White Tipped, Deep Scarlet, Early White small ; Very Early Yellow.
All good varieties.

Olive-Shaped.

Scarlet White Tipped, Half-long Deep Scarlet.

All good varieties, but on account of the dry weather early in the season, none of the Radishes germinated properly.

Winter.

Russian white, large, good ; Black Spanish, large, good ; China Scarlet, small.

PARSLEY.

Sown May 2 ; in use, July 1. Did well.

SAGE.

Sown May 2 ; in use, July 1. Made good growth.

TOBACCO.

Sown in hot-house, March 29 ; transplanted April 22 ; set out, May 22 ; frozen September 17. Not mature.

RHUBARB.

Victoria, in use from May 26 to September 15. Did well, good crop, fine stalks.
Linnaeus, in use from May 26 to September 15. Did well.

NEW SEEDING.

Giant and Linnaeus, sown May 1 ; transplanted July 25. Made good growth.

THE FLOWER GARDEN.

The flower garden was never more beautiful or so long in bloom as during the past season. Commencing on May 5 with Tulips, Crocuses and Pansies, a succession was kept up with Annuals and Perennials until November 2, when heavy frosts during several nights killed a large bed of Pansies, which never looked better than during the last week of October.

The Tulips did not make as good a showing as in former springs. Hot, dry weather set in just as they were coming in flower and a few days, from 14th to 19th May with temperature ranging from 85 to 95 degrees in the shade, killed the bloom.

All other Perennials, especially the Iris and Paeonies, did particularly well.

ANNUALS.—Propagated in hot-house. Sown in hot-house, March 27.

Variety.	Set Out.	In Bloom.		Remarks.
		From	To	
Agrostemma	May 22..	June 29 .	Sept. 17..	Did well. Small pink.
Amaranthus Superbus	" 22..	July 20..	" 17.	Some fine plants.
" Tricolour	" 22..	" 20..	" 17..	" "
" Willow-leaved	" 22..	" 20..	" 17..	" "
Ageratum, Mexican Dwarf	" 22..	" 8..	" 17..	Fine border plant.
Adonis Vernalis	" 22		17..	Did not grow.
Abronia Umbellata	" 30..	July 16..	" 17..	Very fine flowers.
Aquilegia Chrysantha Nana	" 30..		17..	Did not grow.

ANNUALS—*Concluded.*

Variety.	Set Out.	In Bloom. From	In Bloom. To	Remarks.
Ænothera Drummondii	May 30..	July 6..	Sept. 17..	Fine flowers.
Aster, Large Flowering	" 27..	" 9..	" 17..	All varieties did well and the display throughout the season was very fine. Were in full bloom when frozen on September 17.
" Pyramidal Bouquet	" 27..	" 9..	" 17..	
" Lilliput	" 27..	" 9..	" 17..	
" Perfection	" 27..	" 9..	" 17..	
" Half-dwarf	" 27..	" 9..	" 17..	
" Queen of the Market	" 27..	" 9..	" 17..	
" Mixed	" 27..	" 9..	" 17..	
" Giant Comet	" 27..	" 9..	" 17..	
" Queen of the Earliest	" 27..	" 9..	" 17..	
" Japanese Tassel	" 27..	" 9..	" 17..	
" Imbricated Pompon	" 27..	" 9..	" 17..	
Briza Maxima	" 20..	" 15..	.....	Very pretty grass.
Balsam, Double	" 20..	June 15..	Sept. 17..	Very fine bloom.
Chrysanthemum, Double	" 30..	July 5..	" 17..	Very strong growth but flowers were small.
" Frutescens	" 30..	" 5..	" 17..	
" Car. Hyb.	" 30..	" 5..	" 17..	
Coreopsis, Drummondii	" 30..	June 20..	.. ..	A good display of bloom.
" Atkinsoniana	" 30..	" 20..	.....	" "
Cosmos, Hybrid	" 30..	" 20..	.. ..	Very strong growth.
Celosia, Pyramidalis	" 30..	July 20..	Sept. 17..	Good plants.
" " Mixed	" 30..	" 20..	" 17..	
Candytuft	" 30..	June 6..	" 1..	Very fine showing.
Canterbury Bell	.....	.....	....	Did not germinate.
Centaurea Odorata	May 30..	July 5..	Sept. 17..	Very fine showing.
Calendula	" 30..	June 29..	" 17..	Fine, large bloom.
Dianthus, Mixed	" 30..	July 5..	" 17..	The four varieties made an excellent show.
" Chinese Double	" 30..	" 5..	" 17..	
" Plumarius Double	" 30..	" 5..	" 17..	
" Chinese Single	" 30..	" 5..	" 17..	
Dahlia, Single Dwarf	" 21..	" 9..	" 17..	Did well.
Delphinium, Elatum	" 30..	Aug. 30..	.....	Did not do well.
" Dwarf Candelabra	" 30..	" 30..	....	" "
" Large flowering	" 30..	" 30..	.....	" "
Dianthus, Marguerite	" 30..	July 5..	. .....	Made excellent show.
" Indian Pink	" 30..	" 5..	.....	" "
" Mixed	" 30..	" 5..	. .. .	" "
Gaillardia, Grandiflora	" 30..	June 20..	Sept. 17..	Very good show.
" Picta	" 30..	" 20..	" 17..	" "
Godetia, Mixed	" 30..	" 14..	" 17..	Did well. Good show.
" Tall Mixed	" 30..	" 14..	" 17..	" "
" Splendens	" 30..	" 14..	" 17..	" "
Gypsophila elegans	" 30..	July 8 .	" 17..	Small, tender pink flowers.
Helichrysum	" 30..	" 20..	" 17..	Some fine flowers.
Hollyhock, Double Mixed	" 30..	.....	....	Made fair growth.
Iberis Gibralteriana	" 30..	Aug. 15	Sept. 27..	Very pretty late in season.
Lobelia	" 30..	June 22..	" 17..	Did well. Good border plant.
Linum Grandiflorum	" 30..	July 8..	.....	Did fairly well.
Marvel of Peru, Mixed	" 30..	" 21..	Sept. 17..	Strong growth. Very fine flowers.
" Variegated	" 30..	" 21..	" 17..	
Nigella	" 22..	" 5..	" 10..	Did well. Pretty flower.
Nicotina	" 22..	June 29..	" 17..	Did fairly well.
Sultan Marguerite	" 28..	" 2..	.....	Very fine bloom.
Sweet Alyssum	" 22..	" 25..	.....	Fine bloom.
Stocks, German Large	" 20..	" 24..	Sept. 17..	Made very fine show. Flowered till frozen, and some of the spikes were very beautiful.
" Double	" 20..	" 24..	" 17..	
" Victoria	" 20..	" 24..	" 17..	
Verbena, Hybrid	" 21..	July 1..	.....	Made good show.
Salpiglossis	" 30..	" 20..	Sept. 17..	Some good flowers.
Scabiosa	" 30..	" 5..	" 17..	Did well.
Swan River Daisy	" 30..	" 20..	" 17..	Did well. Very pretty flower.
Phlox, Mixed	" 22..	June 16..	" 17..	Very fine show.
" Dwarf	" 22..	" 16..	" 17..	" "
Zinnia, Double	" 21..	" 22..	" 17..	Some large blooms.
Petunia, Grandiflora	" 22..	" 20..	" 17..	Extra fine.
" Giant of California	" 22..	" 20..	" 17..	"
" hybrida flore pleno	" 22..	" 20..	" 17..	"
Portulaca, Double Mixed	" 22..	July 10..	" 17..	Did well.

ANNUALS—SOWN IN THE OPEN.

Variety.	Sown.	In Bloom.	Remarks.
Helianthus	May 4..	July 25..	Good growth, large blossoms.
Nasturtium	" 4..	" 6..	Good show, fine blossoms.
Sweet Pease	" 3..	" 20..	Did well after rains came.
Poppy	" 7..	" 30..	Did not do well.
Ageratum	" 4..	.....	Seed did not germinate.
Alyssum	" 4..	July 1..	Good show.
Aster	" 4..	" 15..	Some fine blooms.
Antirrhinum	" 4..	" 10..	Very fine.
Candytuft	" 4..	" 5..	"
California Poppy	" 4..	" 10..	"
Chrysanthemum	" 4..	" 12..	Good show.
Coreopsis	" 4..	" 8..	Did not do well.
Calliopsis	" 6..	" 8..	Fine show.
Centaurea	" 6..	" 8..	Large blossoms.
Helichrysum	" 6..	" 20..	Good show.
Dianthus	" 6..	" 15..	Very fine blooms.
Linum Grandiflorum	" 6..	" 8..	Good show.
Swan River Daisy	" 6..	" 15..	"
Gaillardia	" 6..	" 15..	"
White Swan Poppy	" 6..	" 10..	"
Gysophila Elegans	" 6..	" 10..	Small pink flower.
Mignonette	" 6..	" 1..	Did well.
Phlox Drummondii	" 4..	" 10..	"
Zinnia	" 4..	" 8..	Fine large bloom.
Marigold	" 4..	" 23..	Made fine show.
Salpiglossis	" 4..	" 20..	Some very fine bloom.

PERENNIALS (OLD BEDS).

Beds of Pansies, Sweet William, Larkspur, Columbine, Lychnis and Everlasting Pea, came through the winter in good condition and flowered freely during the season.

The Pansies and Sweet William were particularly fine, the former continuing to bloom until frozen solid in November.

BULBS

Tulips.

In bloom on May 5. On account of hot dry weather, when Tulips came in bloom, the flowering was irregular ; the flowers were small, and some dried up before opening.

Gladioli.

Transplanted May 29 ; in bloom July 21. Were in full bloom about the end of July, and the bed was one of the most attractive in the garden.

Cannas.

The following varieties were set out on May 20 and came in bloom July 15. Some of the specimens were magnificent in bloom. The following were tested :—

Austria, Allemania, Aphrodite, Asia, Burbank, Baron de Poily, C. Bernardin, Comte de Bouchard, Explorateur Campbell and Florence Vaughan.

Dahlias.

In bloom on July 1. Twenty-two varieties were tested and some very large and beautiful flowers were grown. Among the finest, were :

Liliputian, Little Pigmy, Snow-clad, Woman-in-white and Cactus Queen.

The latter was very like a Chrysanthemum, and had not the stiff appearance generally noticed in Dahlias.

The following were also tested :—

Bird of Passage.
Cochineal.
Chairman.
Chimson Beauty.
Constance.
Clifford W. Burton.
Fairy Queen.
Gem.
Hector.
Herbert Turner.
Herbert.
John Sladd
Lyndhurst.
Lady Autrobus.
Mantas la Villa.
Mrs. Peart.
Mrs. Langtry.
Nemesis.
Perfect Vallose.
Sambo.
Victory.
Wm. Agnew.

Iris.

Of the Iris received from the Central Experimental Farm, and planted in 1900, the following died during the winter of 1900-01 :

Iris Germanica,
" " *Asiatica,*
" *goldenstadtiana coerulescens,*
Iris plicata Lord Seymour,
" " Reine des Belges,
" " Swertii,

The following maintained a very fine succession of bloom from May 24 to July 20, and on account of the deep green of the foliage, the bed was attractive during the whole season :

Iris amœna, Crebillon,
" " Mrs. H. Darwin.
" " Julia Grisi.
" " Maria Theresa.
" " Victor Lemoine.
" *aurea.*
" *Balkana.*
" *biflora.*
" *biglumis.*
" *Blondovi.*
" *cristata.*
" *chamaeiris.*
" *ensata.*
" *flavescens.*
" *florentina.*
" *furcata.*
" *Germanica.* Verschuur.
" *gigantea.*
" *Hungarica.*
" *neglecta,* Agathe.
" " Arlequin Milanais.
" " Hericartiana.
" " Sappho.
" *nudicaulis.*
" *orientalis.*
" *ospetala.*
" *pallida.*
" *prismatica.*
" *pumila.*
Iris pumila cinerea.
" " *gracilis.*
" " *lutea.*
" *ruthenica.*
" *sibirica.*
" " *alba.*
" " *haematophylla.*
" " *violacea.*
" *squalens.*
" " Bronze Stoffels.
" " Dina.
" " Hector.
" " La Marmora.
" " La Tristesse.
" " Minerve.
" " Tarquin.
" *variegata.*
" " Arquinto.
" " Coquette.
" " Darius.
" " Gracchus.
" " Henry Havard.
" " Honorabile.
" " Innocenza.
" " Pancrace.
" " Samson.
" " Souvenir.
" " Minos.
" *virescens.*

PERENNIAL PHLOX.

In May, 1900, 23 varieties were received from the Central Experimental Farm, and planted. The following lived through the winter but made very little progress this year :

Phlox decussata Sorpillum.

Phlox decussata, New Dwarf White.

Phlox reptans.

PAEONIES.

Of the 33 varieties received from the Central Experimental Farm, and planted in May, 1900, 17 died during the summer of that year or the winter of 1900-01.

The following varieties came through the winter in good condition and formed a very attractive bed during the season. Some of the white varieties were very fine.

Paeonia sinensis, Thorbecki.
" " Souvenir de l'Exp. Universelle.
" " Mons. de Villeneuve.
" " Albiflora Thorbecki.
" " Officinalis Mutabilis.
" " Professor Morren.
" " Festiva Maxima.
" " De Candolle.

Paeonia sinensis, Mutabilis.
" " rubicunda albo marg.
" " rubra plenissima.
" " Festiva.
" " Duchess d'Orleans.
" " Ambroise Verschaffelt.
" " Prosper d'Aremberg.
" " L'Eclatante.

HERBACEOUS SPIREAS.

Twelve varieties were planted in the spring of 1900, but not a single plant lived through the winter.

OTHER PERENNIALS.

A fair proportion of the large list of sundry Perennials received last year from the Experimental Farm, Ottawa, came through the winter in good condition and bloomed this year. Following is a list of the varieties living at the end of this season :—

Achillea millefolium rubrum.
" Sibirica Blush.
" " White.
" Ptarmica fl. pl.
Acorus spurius.
Asarum Canadense.
Ajuga reptans atropurpurea.
" Genevensis.
Aster Noviæ Angliæ roseus.
" " Newry seedling.
" " Top Sawyer.
" " W. Bowman.
" " White Queen.
Asclepias tuberosa.
Artemisia stellarianum.
Boltonia latisquama.
" asteroides.
Chelone barbata.
Clematis recta.
Coreopsis delphinifolia.
Centaurea montana alba.
" macrocephala.
Campanula Rainerii.
Doronicum Clusii.
Erigeron macranthus.
Funkia lancifolia.
" Sieboldiana.
Geranium maculatum.
Helenium grandiflorum.
Heuchera sanguinea.
Hemerocallis Dumortieri.
" fulva.
" Kwanso fl. pl.
" variegata fl. pl.
" Midendorfii.
" disticha fl. pl.
" graminifolia.
Helianthus Maximiliana.
" giganteus.
" autumnale.
Lupinus polyphyllus.
Lilium superbum.
Lysimachia nummularifolia.
" punctata.
" clethroides.
Poterium officinale.
Pyrethrum uliginosum.
Phalaris arundinacea fol. var.
Physostegia Virginica alba.
Rudbeckia laciniata.
Sempervivum Boulicianum.
Symphitum asperrimum.
Sidalcea candida.
Solidago gigantea.
" rigida.
Thermopsis fabacea.
" Caroliniana.
Veronica spicata.
" Virginica.
" elegans carnea.

TREES AND SHRUBS.

The trees and shrubs on the Farm have never been in a more healthy and vigorous condition than during the past season. There being no spring winds or frosts to injure even the most tender varieties ; all made a rapid and strong growth from the start. Every tree and bush on the Farm was in full leaf on May 24.

The growth during the season was remarkable in all species and varieties. Maple trees and hedges, willow hedges and elm trees made from 4 to 6 feet, and all new wood was well ripened before winter set in.

Unfortunately, in September, a very heavy storm of wet snow broke down a good many varieties of trees and shrubs and was particularly severe on the hedges, several of which were flattened to the ground. As far as possible the snow was shaken off by hand, but with the miles of avenues and hedges on the Farm, the extent to which this work could be carried on was comparatively small.

Of the shrubs, the Siberian pea-tree, lilacs, honeysuckles and spireas did particularly well. The lilacs were a mass of bloom beginning May 19 and made by far the best showing we have ever had. The same, in fact, was the case with all shrubs, but the lilacs so much surpassed any former year, that they were very noticeable.

Like the trees, all varieties of shrubs thoroughly matured their wood and are in good condition to stand the winter.

The distribution of trees, tree seeds, shrubs and shrub seed was larger than usual last spring, but the demand was very largely in excess of the supply available for that purpose.

A fungus destroyed the maple seed throughout the greater part of Assiniboia, this year, and the seed for distribution had to be obtained from Manitoba. The trees on the Farm bore more than sufficient seed to supply all applicants, but it was rendered useless by this fungus. Ash, elm and caragana seed was abundant and good, and a sufficient supply has been secured.

THE DISTRIBUTION OF SEEDLING TREES BY THE FORESTRY BRANCH OF THE DEPARTMENT OF THE INTERIOR.

The Department of the Interior, Ottawa, having decided to grow trees for distribution among the settlers of the North-west Territories, fifteen acres of land on the Experimental Farm was granted by the Department of Agriculture for the use of the Forestry Branch, under Mr. E. Stewart, superintendent, for the purpose of raising seedling trees.

This land was in good condition ; but when the maple seed was sown, a very dry spell set in and only a small proportion of the seed germinated. In addition to the maple, seed of elm, birch, ash and caragana arborescens was sown, and cuttings of poplar and willow planted.

A great many thousand trees will be available for distribution next spring, and by the spring of 1903, with the additional land taken, there should be many hundreds of thousands ready for the same purpose.

In the past twelve years the demand for trees and shrubs from the Experimental Farm has been far greater than the supply ; and it will tax the resources of the Forestry Branch to meet the demands, which are steadily on the increase, for trees for the southern portion of the Territories.

It is not intended to curtail the extent of the Experimental Farm distribution, and from the number of applications already received, more material than ever will be required for the coming spring ; but the Experimental Farms have received instructions to render the Forestry Branch every assistance in the good work they have undertaken.

ARBORETUM.

The Arboretum made good progress during the season, and as many of the species and varieties are now flowering and fruiting, it is becoming one of the most attractive spots on the Farm.

Following will be found a list of the species and varieties at present under test, with date planted, and notes as to hardiness. Those which have come through one or more winters without injury, or with very slight injury to the tips only, have been marked 'hardy' ; where the new wood has been killed back to one-half its growth, such

are said to 'half hardy,' and those which have had their wood killed by winter, to the ground, have been noted as 'tender.' The list also includes a number of varieties which were received and planted last spring. Of course no opinion can be expressed at present as to the hardiness of these.

Name.	Common Name.	Planted.	Remarks.
Acanthopanax sessiliflorum		1900	Nearly hardy.
Acer dasycarpum	White maple	1896	Half hardy.
" Negundo	Box-elder	1895	Hardy.
" platanoides	Norway maple	1896	Half hardy.
" saccharinum	Rock or Sugar maple	1899	"
" " Minnesota seed No. 1		1897	Nearly hardy.
" tataricum Ginnala	Ginnalian maple	1895	Hardy.
Alnus glutinosa	Common alder	1896	Half hardy.
" " imperialis	Imperial cut-leaved alder	1899	Tender.
" viridis	Green alder	1896	"
Amelanchier alnifolia	Alder-leaved June-berry	1895	Hardy.
Amorpha canescens	Lead plant	1900	Half hardy.
Artemisia Abrotanum	Old man	1895	"
" " tobolskianum		1895	"
Berberis amurensis	Amur Barberry	1899	Hardy.
" aristata		1896	Half hardy.
" cerasina		1896	Hardy.
" cretica	Cretan Barberry	1899	Nearly hardy.
" Fischeri		1896	Half hardy.
" ilicifolia	Holly-leaved Barberry	1896	Tender.
" Sieboldii	Siebold's "	1898	Half hardy.
" sinensis	Chinese "	1896	"
" Thunbergi		1897	"
" Hybrid No 2		1899	Nearly hardy.
" vulgaris iberica		1899	"
" " japonica		1899	Half hardy.
" " foliis purpureis		1896	Tender.
" " violacea		1897	Nearly hardy.
Betula alba	European White Birch	1895	Hardy.
" " fastigiata	Pyramidal Birch	1899	Tender.
" " laciniata pendula	Cut-leaved "	1899	"
" " pendula Youngii	Young's Weeping Birch	1900	Half hardy.
" davurica		1896	Hardy.
" (from Niemetz)		1898	Half hardy.
" lenta	Sweet Birch	1899	Nearly hardy.
" papyrifera	Paper "	1896	"
" populifolia	White "	1899	"
" pumila	Low "	1899	Hardy.
Caragana arborescens	Siberian Pea-tree	1895	"
" Chamlagu		1900	"
" frutescens	Woody caragana	1895	"
" " mollis glabra		1896	"
" grandiflora	Large-flowered caragana	1896	"
" microphylla		1901	
" pygmaea	Dwarf caragana	1896	"
" " aurantiaca		1900	"
Celastrus scandens	Climbing Bitter-sweet	1898	Half hardy.
Celtis occidentalis	Hack-berry	1901	
Clematis flammula	Sweet-scented Virgin's bower	1898	Half hardy.
" lignsticifolia		1898	Hardy.
" vitalba	Common traveller's joy	1898	Half hardy.
" viticella		1901	
Cornus alba Sibirica	Siberian Dogwood	1897	Hardy.
" " variegata	Variegated "	1897	Nearly hardy.
" amomum		1897	Tender.
" Baileyi		1899	Hardy.
" sanguinea		1897	Half hardy.
" Spathii Golden		1899	Tender.
" stolonifera		1896	Hardy.
Cotoneaster acutifolia		1899	"
" integerrima	Common Cotoneaster	1896	"
" laxiflora		1899	"
" No. 10 (Niemetz)		1898	"

Name.	Common Name.	Planted.	Remarks.
Crataegus chlorosarca		1896	Hardy.
" coccinea	Scarlet Haw	1896	"
" Crusgalli	Cockspur thorn	1896	"
" nigra		1900	"
" Oxyacantha sibirica		1897	"
" No. 9 (Niemetz)		1898	"
" sanguinea		1897	"
Cytisus biflorus		1899	Tender.
" capitatus		1899	Hardy.
" nigricans		1899	Half hardy.
" " longispicatus		1898	Tender.
" sessilifolius		1896	Half hardy.
Elaeagnus angustifolia	Russian Olive	1895	Hardy.
" argentea	Wolf willow	1895	"
Euonymus atropurpureus	Burning bush	1896	Half hardy.
" europeus	Common spindle-tree	1896	"
" obovata		1899	Tender.
Fraxinus americana	White ash	1896	Nearly hardy.
" berlanderiana	Berlander ash	1897	Tender.
" nigra	Black ash	1899	Hardy.
" pennsylvanica	Red ash	1895	"
" " lanceolata	Green ash	1899	"
" quadrangulata	Blue ash	1897	Tender.
Genista tinctoria Sibirica		1899	"
Gleditschia triacanthos inermis		1900	"
Gymnocladus canadensis	Kentucky Coffee-tree	1898	"
Hippophae rhamnoides	Sea-buckthorn	1901	
Hydrangea paniculata, grandiflora		1896	Tender.
Laburnum alpinum		1899	"
Ligustrum amurensis	Amur privet	1899	Half hardy.
" vulgaris fol. aureis variegatis		1899	Tender.
Lonicera Alberti	Albert Regel's Honeysuckle	1896	Hardy.
" glauca	Glaucous-leaved	1899	"
" gracilipes		1898	"
" hirsutus	Hairy Honeysuckle	1899	"
" Periclymenum	Woodbine	1901	
" punicea		1899	Tender.
" ruprechtiana		1901	
" Sullivantii		1901	
" tatarica	Tartarian honeysuckle	1896	Hardy.
" Xylosteum		1899	"
Memispermum dauricum		1900	Tender.
Neillia opulifolia	Ninebark	1900	Hardy.
Ostrya virginica	Ironwood	1899	Hardy.
Philadelphus deutziaeflorus		1896	Half hardy.
" grandiflorus	Large flowered Syringa	1896	"
" hybridus Lem Boule d'Argent		1899	Tender.
" Ketelcerii flore pleno		1900	"
Photinia variabilis arguta		1899	"
Pyrus aria flabelliformis		1897	Hardy.
" baccata	Siberian crab	1896	"
" rotundifolia		1900	Tender.
" americana	American Mountain ash	1896	Hardy.
" aucuparia	European " "	1896	Half hardy.
" Maulei	Maule's Japanese Quince	1899	"
Prunus Maximowiczii		1899	Hardy.
" pennsylvanica	Wild Red cherry	1895	"
" pumila		1895	"
" demissa	Western wild cherry	1895	"
" grayana		1896	"
" Maackii		1896	"
" serotina	Wild Black cherry	1899	Half hardy.
Populus alba nivea		1896	Hardy.
" " pyramidalis	Pyramidal Silver poplar	1896	Nearly hardy.
" balsamifera	Balsam poplar	1895	Hardy.
" berolinensis		1895	"
" certinensis		1896	"
" deltoidea	Cotton-wood	1895	"
" " aurea	Golden-leaved poplar	1901	
" nigra	Black poplar	1898	"
" " betulaefolia		1896	"

Name.	Common Name.	Planted	Remarks.
Populus nigra Nolesti		1896	Hardy.
" petrowskyana		1896	"
" suaveolens		1898	"
" tremuloides	American aspen	1895	"
" Wobstii		1896	"
Potentilla fruticosa	Shrubby Cinque-foil	1899	"
Quercus coccinea	Scarlet Oak	1899	Half hardy.
" macrocarpa	Mossy-cup Oak	1895	Hardy.
Rhamnus cathartica	Common Buck-thorn	1896	"
" crenata		1900	Tender.
" davurica		1899	Hardy.
" Frangula		1896	"
" No. 13 (Niemetz)		1898	"
Rhus glabra	Smooth Sumach	1896	Nearly hardy.
Ribes alpinum	Mountain Currant	1899	Tender.
" " pumilum		1899	Hardy.
" aureum	Missouri Currant	1899	"
" " tenuiflorum		1901	
" cereum	White-flowered Currant	1899	"
" gordonianum		1899	Tender.
" robustum		1899	"
" (from Cypress Hills)		1900	Hardy.
" Sibirica		1898	"
Rosa blanda	Smooth Rose	1898	"
" californica		1899	Half hardy.
" ferruginea	Purple leaved Rose	1895	Hardy.
" rugosa	Japanese Rose	1896	"
" villosa pomifera		1898	Nearly hardy.
Rubus balfouriana		1900	Hardy.
" caesius		1900	"
Sambucus canadensis	Common Alder	1896	Nearly hardy.
" nigra aurea nova		1896	Tender.
" " foliis aureis		1896	"
" " heterophylla		1896	"
" " Swindonensis		1899	"
" No. 45 (Niemetz)		1898	"
" (Blue-fruited from B.C.)		1899	"
" nigra virescens		1899	"
Shepherdia argentea	Buffalo Berry	1895	Hardy.
Salix alba argentea	Silver leaved Willow	1897	Half hardy.
" " britzensis		1896	Hardy.
" aurea pendula		1896	Nearly hardy.
" Bataviæ		1898	"
" Caprea	Goat Willow	1897	Half hardy.
" daphnoides	Violet Willow	1895	Hardy.
" longifolia argyrophylla		1898	Half hardy.
" Nicholsoni purpurescens		1898	Nearly hardy.
" nigricans	Dark broad leaved Willow	1898	"
" pentandra	Laurel leaved Willow	1896	Hardy.
" purpurea pendula		1896	"
" rubra forbyana		1896	Half hardy.
" Salamoni		1898	"
" triandra		1897	Hardy.
" Voronesh	Voronesh Willow	1895	"
Spiræa arguta		1896	"
" chamaedrifolia		1896	"
" discolor	White-beam leaved Spiraea	1899	Half hardy.
" japonica	Japanese Spiraea	1899	Tender.
" " alba	White Japanese Spiraea	1899	Half hardy.
" " Bumalda		1899	Tender.
" " superba		1896	"
" media		1899	"
" salicifolia	Common Meadow-sweet	1899	Hardy.
" sorbifolia	Sorbus leaved Spiraea	1898	Half Hardy.
" tomentosa	Hard-hack	1898	Tender.
" Van Houttei		1895	Half hardy.
Symphoricarpus Heyeri		1900	Tender.
" racemosus	Snow-berry	1895	Hardy.
Syringa chinensis	Rouen Lilac	1896	Hardy.
" Josikea	Josika's Lilac	1895	Nearly hardy.
" pekinensis	Pekin Lilac	1899	Half hardy.

Name.	Common Name.	Planted	Remarks.
Syringa villosa		1895	Hardy.
" vulgaris	Common Lilac	1895	"
" " Abel Carrière		1901	
" " Alba	White Lilac	1899	Hardy.
" " " Grandiflora		1899	"
" " Alphonse Lavallee		1901	
" " Charles Joly		1901	
" " Charles X		1899	Hardy.
" " Condorcet		1901	
" " Congo		1901	
" " Emilie Lemoine		1901	
" " Francisque Morel		1901	
" " Jean Bart		1901	
" " La Tour d'Auvergne		1901	
" " Lemoinii		1901	
" " Mad. Casimir Perier		1901	
" " Mad. Lemoine		1901	
" " Marie Legraye		1901	
" " Mathieu de Dombasle		1901	
" " Michel Buchner		1901	
" " President Grevy		1901	
" " Maxime Cornu		1901	
" " purpurea		1896	Hardy.
" " Virginite		1901	
Tilia americana	Basswood	1896	Half hardy.
Ulmus americana	American Elm	1895	Hardy.
Viburnum Lantana	Wayfaring tree	1898	Half hardy.
" Opulus	High-bush Cranberry	1895	Hardy.
" " sterile	Snow-ball	1898	Half hardy.
" prunifolium	Black haw	1899	Hardy.
Coniferæ.			
Abies balsamea	Balsam Fir	1896	Hardy.
" " variegata	Variegated Fir	1900	Tender.
" lasiocarpa		1898	Half hardy.
Juniperus communis	Common Juniper	1901	
" Sabina	Common Savin	1901	
" " variegata	Variegated Savin	1901	
" virginiana elegans variegata		1899	Hardy.
" " glauca		1899	Half hardy.
" " Schotti		1899	Hardy.
" " tripartita		1899	Tender.
Larix europea	European Larch	1899	Nearly hardy.
" pendula	American Larch	1896	Hardy.
Pseudotsuga Douglasii	Douglas Spruce	1895	Nearly hardy.
Picea alba	White Spruce	1895	Hardy.
" " coerulea		1901	
" " variegata		1899	Hardy.
" alcockiana	Alcock's Spruce	1898	Tender.
" excelsa	Norway Spruce	1895	Nearly hardy.
" " pendula major		1899	Tender.
" " pyramidalis	Pyramidal Norway Spruce	1899	Nearly hardy.
" nigra	Black Spruce	1901	
" obovata schrenkiana		1899	Hardy.
" pungens	Rocky Mountain Spruce	1895	"
" " glauca		1899	"
Pinus Cembra	Stone Pine	1895	"
" Laricio nigricans	Austrian Pine	1899	Tender.
" montana	Mountain Pine	1895	Nearly hardy.
" " Mughus	Dwarf Mountain Pine	1899	Half hardy.
" sylvestris	Scotch Pine	1895	Nearly hardy.
Thuya occidentalis	White Cedar	1895	"
" " Hoveii	Hovey's Arbor-vitæ	1900	Half hardy.
" " Mechani	Meehan's Arbor-vitæ	1900	Tender.
" " Columbiae		1899	Nearly hardy.
" " Wareana	Ware's Arbor-vitæ	1899	"

Sample Hedges.

The sample hedges did well this year. The following varieties have been added to the last list :—

Celtis Occidentalis, Cornus Stolonifera, Abies Balsamea, Picea Nigra, Juniperus Communis, Picea Coerulea.

FRUIT TREES AND BUSHES.

The season was most favourable for fruits of all kinds with the exception of black currants and strawberries, and the crops of crab apples and plums were the best ever produced on the Farm.

Nearly all varieties came through the winter in good condition and blossomed freely. Warm weather with a sufficient amount of rain, rushed the fruit forward and with the exception of a few varieties of late plums, everything had matured before the frost of September 17, which was hard enough to ruin all unpicked fruit.

No damage was occasioned by insects, except in the case of plum trees which were attacked by an Aphis in July. The trees were sprayed twice with kerosene emulsion, and so far as could be observed, did not sustain much injury from the attack.

SEEDLING APPLES.

The two seedlings each of Tonka and Arctic, planted in the spring of 1899, have continued to do well. The trees were alive at the tips this spring and made strong growth during the season.

In 1900, six trees each of Wealthy, Blushed Calville and Hibernal, received from Mr. A. P. Stevenson, Nelson, Manitoba, were planted. Four Wealthy and two Blushed Calville lived through the winter and made fair progress this season.

GRAFTING.

Last spring scions of hardy apples and crab apples were received from Mr. A. P. Stevenson, Nelson, Manitoba, and top-grafted on the Pyrus Baccata and Pyrus Prunifolia which were planted in 1896, and have been fruiting for two or three years.

Thirteen trees were top-worked by Mr. Geo. Lang, with from 4 to 10 scions each. The following grafts struck and made strong growth during the season :—

Two Hibernal on Pyrus Baccata Macrocarpa.
One Antonovka on Pyrus Prunifolia.
Three Anisette on Pyrus Prunifolia.
One Lieby on Pyrus Baccata Cerasiformus.
Two Transcendent on Pyrus Baccata Macrocarpa.

FRUITING.

CRAB APPLES (*Pyrus Baccata*).

Planted 1896.

The trees wintered well and by May 18 were a mass of bloom. A strong, healthy growth has been made during the season and the wood ripened fairly well before winter set in. The heavy snow storm on September 23, 1901, did con-

siderable damage to the limbs and branches, but on account of the upright character of most of the trees the breakage was not so severe as to cause permanent injury.

The varieties have all grown well and continue to be perfectly hardy. The notes following are confined to fruiting.

To test the fruit a considerable quantity was made into jelly and pickles, and for either of these commodities nothing better could be desired. The astringency of the fruit disappears in the jelly, and the acidity can be overcome by the addition of sugar.

INDIAN HEAD SEEDLINGS.

Pyrus baccata genuina—

Three trees fruited ; ripe September 10 ; fruit about size of Baccata.* Colour yellow with red cheek ; rather acid and slightly astringent.

Pyrus baccata cerasiformis—

Ten trees fruited ; ripe September 5 to 10 ; fruit larger than Baccata ; crop, heavy ; generally acid and astringent.

Pyrus baccata macrocarpa—

Seventeen trees fruited ; ripe September 5 ; fruit generally considerably larger than baccata and the best grown this year. Notes taken on one of the best of these read as follows :—

Row 4, No. 4.—Fruited lightly ; fruit one inch in diameter ; colour, red, streaked ; flat ; Calyx persistent ; flesh juicy and very slightly astringent ; excellent quality. The best crab apple grown this year.

Pyrus baccata sanguinea—

Four trees fruited ; ripe September 1 to 5 ; early ; generally smaller than baccata ; slightly acid and moderately astringent ; flavour good but fruit small.

Pyrus prunifolia—

Eleven trees fruited; ripe September 5 to 10; generally about the size of baccata, juicy, acid and astringent.

SEEDLINGS RECEIVED FROM CENTRAL EXPERIMENTAL FARM, OTTAWA.

Pyrus baccata sanguinea—

Three trees fruited ; ripe September 12 ; considerably larger than baccata ; juicy, slightly bitter and moderately astringent.

Pyrus baccata aurantiaca—

One tree fruited ; size of baccata ; red, slightly bitter and astringent, but juicy and of better flavour than the average.

Pyrus baccata macrocarpa—

One tree fruited ; ripe September 18 ; larger than baccata ; light crop ; yellow with red cheek, juicy, acid and astringent.

Pyrus prunifolia intermedia—

One tree fruited ; ripe September 11 ; a little larger than baccata ; light crop; red juicy, acid and slightly astringent.

*The ordinary form of P. baccata has fruit about the size of a large cultivated cherry.

Pyrus baccata cerasiformis—

Four trees fruited ; ripe September 10 to 20 ; generally about the size of baccata ; rather flat in form ; juicy, red, astringent ; medium crop.

Pyrus baccata genuina—

Five trees fruited ; ripe September 5 to 10 ; fruit generally smaller than baccata ; juicy, slightly acid and very astringent.

HYBRID CRABS.

(Planted spring of 1898 and 1899).

Were transplanted in 1900 to a new location. The transplanting was fatal to many of them.

This spring two trees of cross-bred seedling No. 96 ; 5 trees of No. 95 ; 1 tree of No. 51 ; and 1 tree of No. 529 were alive.

Of the six each of the five varieties of hybrid crabs produced at the Central Experimental Farm, sent as root grafts, and planted in the spring of 1900, only 1 Progress, 4 Charles, 1 Prairie Gem, and 1 Novelty, survived.

These trees are now, however, well established, and will probably make rapid progress next season.

A large number of cross-breds, seedlings of cross-breds, with other seedling Pyrus trees were received from the Central Experimental Farm last spring. Some of these were planted in a new orchard and others were put temporarily in nursery rows to be planted out later.

NEW PYRUS ORCHARD.

A new Pyrus orchard was commenced this year, south of the Superintendent's house, in a plot well sheltered on all sides by hedges, in which the following were set :—

SEEDLINGS.

Two No. 171 ; 3 No. 167 ; 1 No. 198 ; 1 No. 162 ; 1 No. 30 ; 1 No. 107 ; 4 No. 165 ; 1 No. 142 ; 1 No. 161 ; 1 No. 192 ; 1 No. 184 ; 1 No. 183 ; 2 No. 193 ; 4 No. 175 ; 4 No. 520 ; 1 No. 19 ; 2 No. 142 ; 1 No. 79 ; 1 No. 12 ; 1 No. 45 ; 2 No. 116 ; 1 No. 132 ; 1 Eastman ; 1 Aurora ; 2 Cavan ; 2 Belmont ; 6 Rupert ; 4 Hunter, and 1 Carleton.

The following were also set out to the south of the old Pyrus orchard. Unless otherwise marked, all there were sent from the Central Experimental Farm :—

4 seedlings of *Pyrus baccata edulis*.
3 *Pyrus baccata* x Krimskoe.
4 " x Ball's winter crab.
2 " x Pewaukee.
4 seedlings of Hunter.
10 " Progress.
6 " Hyslop Crab. (From Stevenson.)
2 " Sweet Russet Hybrid. (From Stevenson).
7 " Eastman.
8 " Pauline.
9 " Charles.
4 " Belmont.
12 " Prairie Gem.
12 " Dean.
6 " Transcendent Crab. (From Stevenson).
1 " Virginia Crab. "
5 " Minnesota Hybrid. "
6 " Novelty.
4 " Eaton.
8 " Cavan.
4 Rupert hybrid sand cherry.

Most of these are doing well.

5 Row 13, No. 1.
6 Seedlings of Aurora.
6 Row 6, No. 1.
4 *Pyrus prunifolia fructu coccinea.*
4 *Pyrus Sieboldii.* (1850).
4 *Pyrus Malus, A. A.*
5 seedlings of *Pyrus Malus pendula, A. A.*
3 " Philip's sweet crab. (Stevenson).
4 *Pyrus betulæfolia.*
4 " *baccata, A. A.*, 139.
4 " " *orthocarpa.*
4 " " *var.*
4 " " *oblonga, A. A.*
4 " " late keeping variety.
4 " " (2550).
4 " " *flava.*
4 " " *spectabilis floridus.*
4 " " *sanguinea.*
4 " " *spectabilis var*, 1615.
4 " " " *A. A.*
5 " *prunifolia, var*, 139.

PLUMS.

The crop of plums was the heaviest so far grown on the Farm. In many cases the branches had to be propped up to prevent breaking from the weight of fruit, and in some instances even this did not save them.

Sixty per cent of the fruit ripened before frost came. The Aikin plum which was so early in 1900, was again the first to ripen ; but did not prove to be of first-class quality, the fruit being soft and rather tasteless.

Seedlings of Hungarian—Planted 1894.—Came through the winter in good condition. Eleven trees blossomed for the first time, May 19, and set a heavy crop of fruit. Only three trees ripened before the heavy frost on September 17, and it is feared that these are too late to be valuable for the Territories.

Notes.—Row 2, No. 6—Ripe September 15 ; medium crop ; small, yellow, acid.

Row 4, No. 4—Ripe September 13 ; light crop ; medium size ; yellow, of good flavour, but coarse in texture.

Row 4, No. 5—Ripe September 15 ; a light crop ; size, medium ; yellow ; of excellent flavour and texture.

Seedling of Speer—Planted 1895.—Wintered in good condition. Blossomed lightly on May 17, and fruited lightly for the first time. There was no fruit ripe on this tree on September 17.

Seedling of De Soto—Planted 1895.—This wintered in good condition, and blossomed and fruited heavily. The fruit was of good quality and flavour. Ripe September 13.

Seedlings of Weaver—Planted 1894.—Wintered in good condition and came in bloom May 20. Fifty-one trees fruited, and on the whole the crop was an excellent one. The fruit was generally a little later in ripening than the Manitoba Native Plums, but that on 27 trees was ripe and pulled before the frost came on September 17; on twelve others nearly ripe and picked on the 16th ; consequently there was a large proportion of the fruit secured in good condition.

About 25 per cent of the trees produced fruit of good size and excellent quality and flavour. Fifty per cent were of medium size, generally thicker in the skin, but of good flavour and texture ; and the balance were small and of poorer quality, although there were exceptions in all the cases.

The following notes on individual trees are chosen as being fairly representative of the three classes :—

Large Sized Sorts.

Row 1, No. 4.—Ripe September 10. A heavy crop of large, fine fruit ; yellow sweet, juicy, with a thin skin.

Row 1, No. 16.—Ripe September 12. A heavy crop, large, pear-shaped, yellow, red on the sunny side, juicy, and of very fine flavour and texture. Skin, medium. Probably the best plum grown on the Farm this year.

Medium Sized Sorts.

Row 4, No. 15.—Ripe September 15. A heavy crop of medium sized fruit, yellow, juicy, slightly acid, but of good quality ; skin medium.

Row 2, No. 6.—Ripe September 17. A medium crop ; fruit of medium size, yellow and red, juicy, good flavour, sweet ; skin of medium thickness.

Small Varieties.

Row 2, No. 17.—Ripe September 15. A medium crop ; fruit of small size, yellow, and of fair flavour and texture ; thick skin and very small stone.

Aikin Plum.—Planted 1897.—Wintered in good condition. Blossomed May 15. Ripe September 1.

Considering the size of the tree, the crop was a heavy one, and it attracted a great deal of attention during the latter part of the season. Although the Aikin may not be of quite as fine flavour as some of the Weaver seedlings, it is as large and ripens a few days earlier, which would be very much in its favour in a short season.

This variety is undoubtedly a valuable one for the Territories ; and all the pits have been preserved for planting.

Rollingston seedling—Planted 1897.—Blossomed lightly May 17. Produced a light crop of small, red fruit, which did not ripen before frost.

MANITOBA NATIVE PLUMS.

(From Thos. Frankland, Stonewall, Manitoba.)

Wintered in good condition and came in bloom May 17. Crop good.

A considerable quantity of the crop of fruit ripened this year was sold for preserving or canning and samples were sent to different parts of the Territories.

It is gratifying to know that some of the seedling plums distributed to settlers during the past six years are now bearing fruit ; several samples having been, very kindly, sent in by the growers.

PLUM TREES RECEIVED FROM CHAS. LUEDLOFF, COLOGNE, MINN., U.S.A.

Planted 1896.—Came through the winter in good condition and blossomed on May 20.

Name.	Crop.	Size.	Colour.	Texture.	Flavour.	Date ripe.
Charles Downing	Light.	Large	Yellow	Coarse	Excellent	Sept. 6
Reed	Heavy.	"	"	Good	Good	" 6
City	Medium	Medium	"	"	"	" 8
Gaylord	Heavy.	"	Red	"	Excellent.	" 10
Crescent City	"	Large	Yellow	Coarse	Good	" 10
Weaver	"	Medium	"	"	Medium	" 10
New Ulm	Light.	Large	"	Good	Exeellent	" 10
Van Deman	Medium	Medium	"	"	Good	" 10
Milton	Heavy.	Small.	"	Medium	Exeellent	" 10
Anthony	Light.	"	Red			Frozen.
Irene	"	"	Yellow			"
Deep Creek	Heavy.	Medium	"			"
"	"	"	"	Coarse	Medium	Sept. 13
Purple Yosemite	Medium	"	"			Frozen
Cottrell	Heavy.	"	"	Good	Excellent	Sept. 14
"	Light.	Large	"	"	"	" 15
Weaver	Medium	"	"	"	Good	" 13
Van Buren	Light.	Small	"			Frozen
Newman	Heavy.	Medium				"
Dr. Dennis	Light.	Large				"
Yellow Sweet	"	"	Yellow	Good	Good	Sept. 16
Ocheeda	Heavy.	"	"	"	Excellent	" 13
Col. Wilder	Light.	Small.	Red	"	"	" 13
American Eagle	Heavy.	Medium	"	"	Good	" 15
De Soto	Medium	Large	Yellow	"	Excellent	" 15
Crescent City	Heavy.	"	"	"	"	" 13
Neil's	"	Small.	"	"		Frozen.
Wood	Light.	"	"			"
Dunlap No. 1	Heavy.	Medium	"	Medium		"
Peffer's Premium	"	Small.	"			"
Large Red Sweet	"	"	Red	Good	Excellent	Sept. 13
Hammer	Light.	Medium	Yellow			Frozen.
"	Medium	"	"	Medium	Medium	Sept. 15
Silas Wilson	Light.	Large	"			Frozen.
City	Heavy.	Small.	Red	Medium	Good	Sept. 13
Richland	"	Medium	Yellow	Coarse	Medium	" 15

CHERRIES.

Seedling of Carnation —Planted 1894.—Wintered in good condition. Made strong growth, but did not fruit.

Seedling of Lithaur Weichsel—Planted 1894.—Wintered in good condition. Made strong growth during the season, but did not fruit.

Seedling of Olivet —Planted 1895.—One tree winter-killed to ground and was taken up and destroyed; the other came out in good condition and made fair growth.

Mahaleb.—Planted 1895.—One tree was killed slightly at tips; the other wintered in good condition. Did not blossom.

Seedling of Wild Cherry from Nebraska.—Planted 1896.—Apparently now quite hardy. Blossomed and fruited lightly. Fruit like Prunus Demissa, but larger.

Rocky Mountain Cherry.—Planted 1895.—Hardy. Fruited heavily, but fruit is small and too late.

Prunus Pumila.—Hardy. Medium crop of fairly good fruit.

SMALL FRUITS.

The crop of small fruits, with the exception of Black Currants and Strawberries, was above the average; and some excellent fruit was secured.

Rust struck the currants, but as the fruit was well formed, little or no damage was done.

WHITE CURRANTS.

White Grape, White Dutch, White Transparent and White Imperial were under test. All were hardy, made strong growth and produced excellent crops of fruit.

RED CURRANTS.

Fay's Prolific, Raby Castle, Red Dutch, La Conde, Knight's Early Red, New Red Dutch, Native Red, London Red, Victoria, Fertile d'Angers, Cherry, Prince Albert, La Fertile, Versailles, North Star, Pomona and Wilder, under test. Came through the winter in good condition. A large crop of fruit set, which ripened rather unevenly, but on the whole the crop was above the average.

BLACK CURRANTS.

Lee's Prolific, Black Naples, Prince of Wales, Crandall, and the following of Saunders' Seedlings, Stewart, Orton, Clipper, Kerry, Eagle, Monarch, Charmer, Beauty, Winona, Ontario, Standard, Lewis, Ethel, Stirling, Star, Madoc, Perry, Eclipse, Oxford, Climax, all wintered in good condition and made very strong growth. A very light crop of fruit set, but any that matured was of superior size and quality.

RASPBERRIES.

Dr. Reider, Philadelphia, Turner, Caroline, Lady Anne, Garfield, Miller's Red and Kenyon came out of winter covering in good condition and blossomed very freely. The crop was fair. The fruit of Dr. Reider, Miller's Red and Philadelphia was very large and of excellent quality.

GOOSEBERRIES.

Smith's Improved, Lancashire Lad, Governess, Columbus, Houghton, Native, Pearl and Keepsake, under test. All are quite hardy. Made strong growth and produced a medium crop, giving fruit of good size and quality.

STRAWBERRIES.

Capt. Jack, New Dominion, Windsor Chief and Pineapple, under test. On account of the very dry weather during the first two weeks in June, the crop was almost a total failure. Fruit small and inferior.

SUMMER-FALLOWS.

It is very gratifying to know that throughout the Territories, summer-fallowing is rapidly becoming general. No matter where farming is carried on, the farmers realize that to be sure of a crop they must prepare a portion of their land the year before the crop is grown, and apart from the value of the stored moisture, there is the inestimable advantage of keeping weeds from over-running the farm.

The true worth of properly prepared fallows was clearly demonstrated in the season of 1900 in every grain-growing district of Assiniboia, and although the season just past has been an extraordinary one, the crops grown on fallows were, in every case, the heaviest producers.

The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the Territories, that perhaps a few words on one of the methods employed may be of help to at least some of the new settlers.

It has been observed in Alberta and Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full-grown and in many cases, bearing fully matured seed. It is then ploughed.

By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

First Method.—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

Result.—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep)) before the last of June ; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

Result.—Poor crop in a dry year ; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

Third Method.—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June ; surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results ; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughed under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.

BREAKING AND BACK-SETTING.

In view of the fact that every year brings to the Territories, many new settlers who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this very important work may not be amiss.

In all sections where the sod is thick and tough, breaking and back-setting should be done ; while in districts where scrub abounds and the sod is thin, deep breaking is all that is necessary.

The former is generally applicable to Assiniboia, and the latter to Alberta and Saskatchewan, especially to the northern parts of these Territories where the land is more or less scrubby.

SHALLOW BREAKING.

(To be back-set).

The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14 inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit back-setting to commence early in August.

BACK-SETTING.

Back-setting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough but three or four inches will give better results.

After back-setting, the soil cannot be made too fine and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.

DEEP BREAKING.

Deep breaking, which in many sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where

breaking and back-setting would give more satisfactory results, consists in the turning over of the sod as deep as possible ; usually from 4 to 5 inches.

When the sod has rotted, the top-soil should be worked and made as fine as possible. The use of harrow or disc will fill up all irregularities on the surface, and make a fine, even seed bed.

Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come during June or early in July. These rains cause the sod to rot, and without them or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.

To some districts near the foot-hills of the mountains and in districts where scrub abounds, and the sod is thin, these remarks may not apply, but, as a rule, throughout the Territories, early breaking, whether deep or shallow, is advisable.

WORKING LAND AFTER FIRST CROP.

Inquiries are often made as to what should be done after taking off the first crop on new land, the principal being as to whether the land should be ploughed, or cultivated, or sown without any cultivation whatever.

This, however, can only be determined by circumstances. In districts with heavy clay soil, a satisfactory crop may be expected from burning the stubble of the former crop and sowing with or without cultivation ; although a shallow cultivation after the stubble is burnt usually gives the best results.

In districts with light soils and especially with gravelly subsoil, cultivation before seeding is necessary.

After taking the second crop from breaking or back-setting, there can be no doubt that the land should be well fallowed to put it in proper condition for succeeding crops. If the fallow is well made and the process is repeated every third year, the settler will have started on the right road to future success.

CATTLE.

The herd of pure-bred cattle on the Farm is growing slowly and needs new blood to improve its quality.

When the Holsteins were dispensed with there were only six pure-bred Short-horn females on the Farm, and from these the increase has been very slow, from the fact that the calves have been nearly all males, which have been sold or sent to other Experimental Farms.

At present the herd consists of thirteen pure-bred Short-horn females and four bulls, and one bull each of the Guernsey and Ayrshire breeds. There are also eighteen grades.

A few first-class Short-horn females are greatly needed to keep the herd on the Farm up to the requirements of the country.

Fifteen Short-horn grade steers have been purchased this fall for use in a feeding test which will be carried on during the winter.

Since last report, the following pure-bred male has been sold for breeding purpose: Short-horn 'Strathcona,' to A. Isbister, Fort Qu'Appelle.

TEST OF DEHORNING STEERS.

During the autumn of 1900, fifteen 3-year-old steers were obtained from ranchers in the vicinity of Indian Head for use in the test of the practicability of dehorning.

On November 27, after a preparatory feeding of forty-two days, a sixteen weeks' test was commenced to determine :

1st. What loss, if any, is occasioned by the process of dehorning, and

2nd. If feeding loose in a box-stall, rendered possible by dehorning, has any advantage over stall-feeding.

On the above date, the fifteen animals were divided into three lots of approximately equal weight :—

Lot No. 1. Five steers, left in a natural state and tied up.

Lot No. 2. Five steers, dehorned (by sawing off horns with a small hand-saw) and tied up, and

Lot No. 3. Five steers, dehorned (by the same method as above) and put in a loose box.

The three lots received a uniform ration throughout the test, which consisted of :—

During the first four weeks, each animal per day—

	Pounds.
Ensilage (made from green oats)	16
Straw (wheat)	12
Meal	4

During second four weeks, each animal per day—

	Pounds.
Ensilage (made from green oats)	16
Straw (wheat)	12
Meal	8

During third four weeks, each animal per day—

	Pounds.
Ensilage (corn)	16
Straw (barley and oat)	12
Meal	10

During fourth four weeks, each animal per day—

	Pounds.
Ensilage (corn)	16
Straw (barley and oat)	12
Meal	12

The straw was cut and the meal consisted of two parts of ground barley to one part of ground wheat. The steers were fed three times daily, and watered twice.

For a few days after the operation, no effect of the dehorning was noticeable on the animals; but after that time they all went off their feed and for about a week were apparently very sick. The recovery, however, was rapid.

Following will be found a statement of the monthly and total weights and gains of each lot of steers during the period of the test ; weights and gains made by the bunch during the whole period (October 15 to May 10; the total amount and estimated value of feed consumed during the same time, and a summary of the financial results of the transaction : —

MONTHLY and total weights and gains of each lot of steers during the period of test.

Lot.	Weight at Start of Test.	1st Four Weeks.		2nd Four Weeks.		3rd Four Weeks.		4th Four Weeks.		Total Gain.
		Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
No. 1.....	6,390	6,440	50	6,780	340	6,960	180	7,180	220	790
" 2	6,400	6,200	Loss 200	6,470	270	6,700	230	7,000	300	600
" 3	6,400	6,460	Gain 60	6,900	440	7,120	220	7,490	370	1,090

TOTAL weight and gain made during the whole period—October 15 to May 10.

Lot.	Weight when bought October 15.	*Weight when sold May 10.	Gain.
	Lbs.	Lbs.	Lbs.
No. 1	6,260	7,380	1,120
No. 2.....	6,290	7,300	1,010
No. 3.....	6,180	7,640	1,460
Total.....	18,730	*22,320	3,590

*Less 5 per cent shrinkage, 21,204 pounds.

TOTAL weight and estimated value of feed consumed during the whole period—October 15 to May 10.

Preparatory feeding, each lot (5 steers) 42 days—

Ensilage, 16 lbs. per day, 3,366 lbs. at $2 per ton..	3 36
Straw, 12 lbs. per day, 2,520 lbs. at $1 per ton	1 26
Meal, 4 lbs. per day, 840 lbs., at ⅔ cent per lb.	5 60
	$10 22

Or for the three lots, $30.66.

During test (112 days), each lot—

Ensilage, 8,960 lbs. at $2 per ton	$ 8 96
Straw, 6,720 lbs. at $1 per ton	3 36
Meal, 4,760 lbs. at ⅔ cent per lb.	31 73
	$44 05

Or for the three lots, $132.15.

From end of test till sold (51 days), each lot—

Ensilage, 16 lbs. per day, 4,080 lbs. at $2 per ton	$ 4 08
Straw, 12 lbs. per day, 3,060 lbs. at $1 per ton	1 53
Meal, 12 lbs. per day, 3,060 lbs. at ⅔ cent per lb.	20 40
Oil-cake, ½ lb. per day, 127½ lbs. at 3½ cents per lb.	4 45
	$30 46

Or for the three lots, $91.38.

Summary of cost of feeding—

During preparatory feeding	$ 30 66
During test	132 15
Till sold	91 38
	$254 19

Or for each steer, $16.94.
Or for each lot of five steers, $84.73.

Summary of Financial result of the Transaction.

Lot.	Weight bought.	At	Amount paid.	Add Cost of Feed.	Total cost.	Weight sold.	At.	Amount received.	Gain, each Lot	Gain per Head.
	Lbs.	Cts.	$ cts.	$ cts.	$ cts.	Lbs.	$ cts.	$ cts.	$ cts.	$ cts.
No. 1	6,260	3	187 80	84 73	272 53	7,011	4 60	322 50	49 97	9 99
No. 2	6,299	3	188 70	84 73	273 43	6,935	4 60	319 02	45 59	9 11
No. 3	6,180	3	185 40	84 73	270 13	7,258	4 60	333 86	63 73	12 74
Total	18,730	3	561 90	254 19	816 09	21,204	4 60	975 38	159 28	*

* Or an average net gain of $10.62 per head.

SWINE.

There are at present, three breeds kept on the Farm, namely, Berkshire, Tamworth and Yorkshire White.

A pair of Yorkshire Whites and a young Tamworth boar were received from the Central Experimental Farm in June last.

The young animals from any of the above mentioned breeds find ready sale, and with the high price of pork there is no better paying business in the country than hog-raising; although at present very few are engaged in the work.

POULTRY.

Two breeds, Black Minorcas and White Wyandottes, have been kept the past year. The former has given the better returns both in eggs and chickens, and, in fact, for some years has proved the most satisfactory breed to keep.

The only objection to Black Minorcas is their comb, which, however, cannot be considered a detriment where fairly comfortable quarters are provided for the winter months.

HORSES.

There are at present thirteen horses on the Farm. Two of these were brought up when the Farm was started, nearly fifteen years ago, and they are becoming almost too old for work. Two others, obtained later, are also showing signs of giving out.

INSTITUTE MEETINGS.

During the past year, meetings arranged by the Department of Agriculture of the North-west Government, in Southern and Northern Alberta and in the South-eastern portion of Assiniboia, have been attended.

In February, in company with Mr. J. H. Grisdale, Agriculturist of the Central Experimental Farm, Ottawa, and Mr. George Lang, of Indian Head, a most interesting trip was taken in Southern Alberta, when Lethbridge, Magrath, Cardston, Mountain View, Fishburn and Pincher Creek were visited.

At Lethbridge, small-pox had unfortunately broken out and a public meeting could not be held, but a number of leading citizens met in the Town Hall and the matter of tree-planting was fully discussed. From the fact that irrigation had lately become available at Lethbridge, tree-planting was a very live question and was gone into in all its details.

At Magrath, a new Mormon settlement between Cardston and Lethbridge, on the line of the Irrigation canal, two very large and interesting meetings were held. As all the settlers in this neighbourhood had lately arrived from Utah, U.S.A., and were unacquainted with the methods of farming in the Canadian North-west, very close attention was paid to all that was said at both meetings. Fall wheat had been sown the previous fall on new breaking, and at the time of our visit was not discernable above ground ; although the return proved highly satisfactory, the yields are said to have varied from 40 to 50 bushels per acre.

At Cardston two meetings were held ; the one in the afternoon being very large and interesting. In the evening however, a Mormon wedding in the town proved too strong a counter attraction.

The meetings at Mountain View, Fishburn and Pincher Creek, all of which are in the foot-hills of the Rocky Mountains, were well attended.

At all the meetings Mr. Grisdale spoke on Live Stock, Mr. Lang on Tree Culture, while I paid particular attention to the cultivation of the soil for grain and hay.

On returning from Alberta, a series of meetings was attended in company with Mr. George Harcourt of the *Nor'-west Farmer*, Winnipeg, in South-eastern and Eastern Assiniboia, the following towns being visited :—Weyburn, a new settlement on the Soo line of railway ; Gainsboro, Elmore, Carnduff, Carlyle, Cannington Manor, Glen Adelaide, Fleming and Moosomin. At the two latter places Mr. D. Anderson, an Institute worker from the province of Ontario, joined us and addressed the meetings. All the meetings were well attended, especially good gatherings being present at Weyburn, Elmore and Carnduff. Mr. Harcourt spoke on Live Stock, and I spoke on Grain, Grasses and Tree Culture.

During July I accompanied Dr. Jas. Fletcher, Entomologist and Botanist of the Experimental Farms, at a series of meetings in Northern Alberta, and with us at different places were Mr. Maerker, Superintendent, of Dairies for Alberta ; Mr. W. N Willing, Territorial Weed Inspector, and Mr. Blakely of the Nor'-West Farmer Winnipeg.

Olds, Innisfail, Red Deer, Strathcona, Clover Bar, Fort Saskatchewan, Leduc Wetaskiwin, Ponoka and Lacombe were visited and meetings held. At that time the weather and roads were very bad, the latter in some places being almost impassable, so that the attendance on the whole was not large. As these meetings were called for the purpose of discussing weeds and their eradication, Dr. Fletcher was the chief speaker and went into the matter most thoroughly.

DISTRIBUTION OF SAMPLES.

During the months of March, April and May, the following distribution of samples was made to applicants throughout the Territories of Assiniboia, Alberta and Saskatchewan.

The number of applicants was, as usual, largely in excess of the supply of material available for this purpose ; and the stock of seedling trees and shrubs, cuttings of fruit bushes, rhubarb roots and tree seeds grown for this purpose did not begin to fill all the requests received.

Besides the seedlings mentioned below, many thousands of maple trees, from 3 to 5 feet in height, were given to settlers in the districts surrounding the Farm.

Grain.—Wheat, 252 bags, 3 pounds each.
" Oats, 414 bags, 3 pounds each.
" Barley, 68 bags, 3 pounds each.
" Pease, 200 bags, 3 pounds each.
" Sundries, 43 bags, 3 pounds each.

Potatoes, 652 bags, 3 pounds each.

Tree-seeds, Maple, 607 bags, 1 pound each.

Grass-seed, Brome, 261 bags, 1 pound each.

Grass-seed, Western Rye grass, 18 bags, 1 pound each.

Small-seeds, 705 packages, containing 7,986 pa. shrub-seeds, flower-seeds, root-seeds, garden-seeds and corn.

Fruit-bushes, 145 packages.

Tree and shrub seedlings, 217 packages.

Fruit bushes and tree and shrub seedlings, 146 packages.

Rhubarb roots, 98 packages.

Express packages, 43, containing maple trees, 755 ; elm, 140 ; artemisia, 1,000 ; seedling plums, 190 ; sundry shrubs, 900.

CORRESPONDENCE.

During the twelve months ending October 31, 1901, 5,410 letters were received, and 5,333 mailed from this office. In letters received, circular reports on grain and other samples are not counted, and in letters mailed, circulars of instruction sent with grain and other samples are not included.

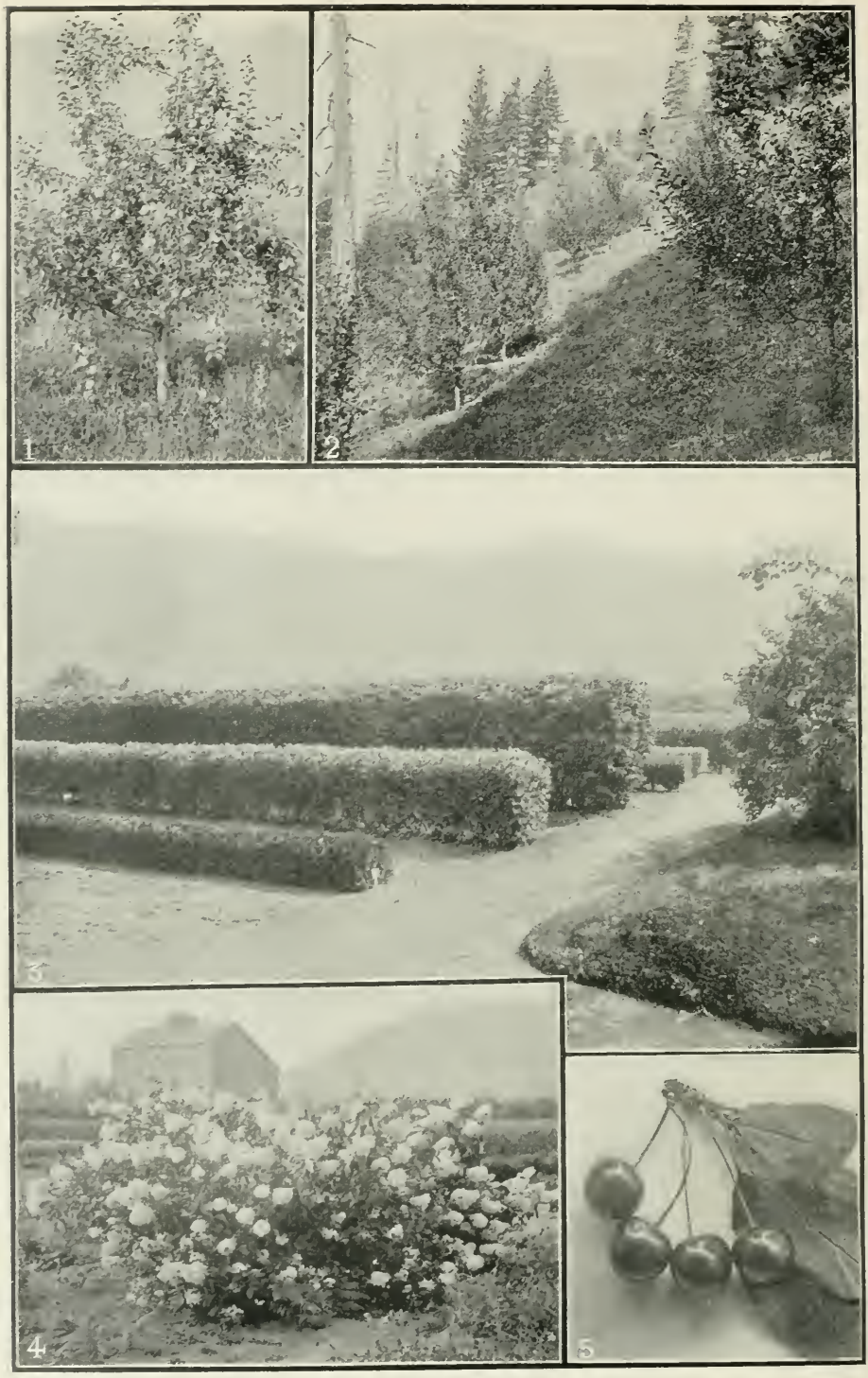
METEOROLOGICAL OBSERVATIONS.

Month.	Highest Temperature.		Lowest Temperature.		Snow-fall.	Rainfall.		Hours of Sun-shine.
	On	Degrees	On	Degrees	Inches.	No. of Days.	Inches.	
1900.								
November	1	52	20	−28	10	.....	.....	52·6
December	17	38	31	−32	8	.....	.....	42·2
1901.								
January	13	35	1	−37	15	.....	.....	59·6
February	28	49	4	−29	3	.....	.....	107·7
March	1	42	4	−20	2	.....	.....	124·6
April	30	79	17	− 9	17	7	1·43	139·3
May	17	95	6	28	.....	2	·87	293·8
June	1	80	7	31	.....	12	5·62	144·5
July	12	89	2	44	.....	10	5·82	222·9
August	26	91	8	36	.....	0	·0	230·5
September	2	81	28	22	25	6	4·9	80·5
October	20	75	31	15	.....	1	1·58	159·0
					80	38	20·22	1657·2

NOTE.—The rainfall in April and September includes melted snow.

I have the honour to be, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.



SCENES ON EXPERIMENTAL FARM, AGASSIZ, B.C.

1. Apple tree in fruit. 2. Part of Orchard on side of mountain. 3. Hedges.
4. Hydrangea paniculata. 5. Cluster of cherries.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

Agassiz, B.C., Nov. 30, 1901.

To Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour herewith to submit my report of the experiments carried on and progress of the general work of the Experimental Farm for the year 1901.

The season has been on the whole a favourable one for hay, grain and root crops, but unfavourable for fruits. January was rather stormy, alternating between snow, and rain, the year opening with snow on the ground, and there were several falls aggregating nineteen inches, which lay until the 11th, when it began to rain. From then to the end of the month there was a little over five inches, but it was never very cold, the lowest temperature being on the 9th, when it reached 11 degrees above zero. February was milder, and fairer, the rainfall being only $2\frac{3}{4}$ inches, and the snowfall 7 inches, the lowest temperature was on the fifth when it registered 16 above zero. March was milder, 6 degrees of frost on the 24th being the lowest point reached, but there were seventeen rainy days, and the rains were cold, and very disagreeable. Peach, apricot, nectarine, almond, and early blossoming plums were in bloom in the last few days of the month, and the last 8 days of the month were stormy, which was injurious to the fruit blossoms.

April opened with a fall of two inches of snow, followed by rain storms up to the 5th when there was another snowfall of two inches, and the month continued cold and wet, there being fourteen rainy days with the prevailing winds from the north, north-east and north-west, with light frosts on a number of mornings. On the 18th the temperature fell to 28 which was disastrous to the fruit crop generally. May continued cool, and rather wet with rain storms on thirteen days and the wind mostly from the north. June began with rain on the first nine days, and cool westerly, and north-westerly winds, rain fell on 21 days, there were only 80 hours of sunshine in this month. Under these conditions, it was almost impossible to cure clover hay, and growth up to the end of this month was backward.

July was fine, clear and bright, there being only seven showery days with a rainfall for the month of $1\frac{1}{4}$ inches. August was dry and warm throughout, it being the first month since the meteorological records have been kept at this station, that there was no rain to record, and only a few cloudy days. September was another beautiful month, with about $1\frac{1}{2}$ inches of rain, and the lowest temperature recorded was 35 on the 28th. There were a few light showers on the 10, 11, 12, and 13th of October, and bright warm days up to the latter part of the month when it began to rain and rained pretty steadily up to the close of the month.

The first frost of the season came on November 11, up to which time it had rained very frequently from the first.

The rainfall as a whole has been much the lightest for some years, but the number of rainy days in the winter and spring months has been greater than usual, especially in the months of April, May and June, and as the prevailing winds in those months were from a northerly direction, they were usually cool months, and unfavourable for the growth of fruits.

In July a new circular silo 15 feet in diameter and 30 feet deep was put up in the barn, and is now nearly filled with corn. The old silo which was put in when the barn was built had decayed on the inside, and was no longer fit for service.

THE FRUIT CROP.

The fruit crop has been a poor one owing to the very unfavourable spring weather, and as a result few trees set fruit, and the continued rains in May and June prevented effective spraying and in consequence scab on apples and brown rot of the cherry and plum, seriously damaged what fruit did set.

HEDGES.

The sample hedges have made satisfactory growth and are very much admired, and of great interest to visitors to the Farm, and many examine them with a view to a selection for their own places.

FOREST AND TIMBER TREES.

The forest trees planted in the shelter belt continue to make vigorous growth, and the nut and timber trees planted on the mountain sides are making fair progress.

ORNAMENTAL SHRUBS AND TREES.

The ornamental shrubs and trees have done well this season, having made a fine growth, and the flowering shrubs and trees have been very beautiful with a wealth of bloom from early spring, beginning with the Forsythias early in March, and ending with the Japan Hydrangeas which are still in bloom.

NUT TREES.

The English, Japanese, American and Heart-shaped walnuts all fruited this year. The Spanish and Japan chestnut trees also produced a few nuts. The crop of filberts was as usual a very poor one and the blue jays carried off many of the nuts before they were fully ripe. Owing to the poor cropping of the filberts and the depredations of the blue jays, which are very plentiful in most districts, it is not at all likely to become a popular bush to plant.

Most of the nuts saved have been distributed to farmers who want to try a few trees on their own farms.

The hardshell almonds did not fruit this year, and the soft-shell varieties, although most of them are fairly large trees, have never borne fruit and may be regarded as useless in this climate.

DITCHING.

The ditch mentioned in my last report has been extended 720 yards further, and the part previously dug has been deepened and widened.

Part of the ditch dug this year was very difficult as owing to ridges to be cut through between sloughs it was in some places over 8 feet wide on top and more than that deep, these deep places are being boxed with 2-in. fir plank and will be filled in.

This was necessary on account of the inconvenience of so deep and wide an open ditch and the trouble in keeping it open on account of the sides caving in.

The ditch has already done good service and land that in some places was formerly covered with water all the year was firm and solid this autumn and will be fit for cultivation in another year.

CLEARING.

About fifteen acres have been cleared of brush and timber and seeded to clover and orchard grass. A very fair catch has been obtained and it will make considerable pasture next season. About 1,200 yards of wire fencing was put up last spring enclosing the new land, and a piece of bush which it is intended to clear in the same way.

LIVE STOCK.

The cattle bought last year for feeding were sold during the winter and spring, except three head, a grade milk cow and two young steers. The young shorthorn bull then on the Farm has been sold and a fine young one sent from Ontario in his stead. At the same time fourteen registered shorthorn heifers were sent out, six of these were forwarded to the British Columbia Dairymen's Association's sale at Victoria and sold, leaving at present on the Farm fourteen pure bred shorthorns and four grades.

SHEEP.

Since my last report a Dorset ram has been added to the stock and one young ram sold, and we have now nine ewes and one ram.

PIGS.

The stock of pigs at present consists of one pure bred Berkshire boar, one Berkshire sow and six young pigs. Two Tamworth sows and eight young pigs and four cross-bred pigs. There is more call for pure Tamworth stock now than at any previous time, and wherever they are introduced they are well thought of.

BEES.

The bees did not winter well and two feeble swarms were all that came through. A new queen was got for these in the spring and the two colonies united. This gave three swarms, and we have now four colonies that are well supplied with honey and should go through the winter in good condition.

POULTRY.

There are five breeds of poultry on the farm: Light Brahmas, White Wyandottes, Silver Laced Wyandottes, Barred Plymouth Rocks and Black Minorcas.

All the poultry are healthy and thrifty, and the chickens strong.

A Cyphers incubator was procured last April of 120 egg capacity. By the first hatch we had 65 strong chickens out of 88 fertile eggs. The incubator was filled again, and out of 95 fertile eggs there were hatched 50 chickens.

The Minorcas prove the best layers here and their eggs are large, but the chickens are rather delicate and difficult to raise as they feather so young.

The Brahmas are good layers and the chickens are hardy and easy to raise. The parent stock should be kept thrifty by having a large run, a variety of food, and change of male bird every year. It is always necessary for the heavy breeds to have a large run, otherwise their eggs will not hatch well, neither will their chickens be strong.

The Barred Plymouth Rocks have done very well ; they lay nearly as well as the Brahmas, and their eggs produce strong chickens, which matured a little earlier than the Brahmas. They make a fine lot of even looking pullets and cockerels. Only one of the B. P. Rock chickens died of illness. One B. P. Rock cockerel weighed 6 lbs. at five months old, and a Brahma cockerel of same age weighed 5¾ lbs. A Silver Laced Wyandotte and White Wyandotte cockerel weighed each 5½ lbs. at five months' old. These chickens were well cared for but were not fattened and were always at large, when the weather was dry.

The Silver Laced Wyandottes and White Wyandottes are good fowls, both for eggs and chickens, but are not quite so profitable here as the Brahmas and B. P. Rocks.

The Poultry are all allowed to run at large, except when put into pens for breeding purposes, from January 1 to July. They are comfortably housed and regularly fed, but are never forced either for fattening or for eggs.

In allowing the hens to run at large not only are they much better and healthier than when confined, but they also pick up many injurious insects on the lawn, and in the fruit orchards. When the weather is fine they go a long distance from the hen house, and are a very great benefit to the whole farm in picking up grasshoppers and other insects.

EXPERIMENTS WITH OATS.

Sixty-three varieties of oats were sown in the uniform test plots. All were sown April 18 at the rate of 2½ bushels per acre, on sandy loam which had been in pease in 1900 following clover. The size of plots was one-fortieth of an acre. There was very little rust and no smut, and the sample is a very fair one and the yield in most cases very good. The weight per bushel is obtained by weighing a half bushel of the oats as they come from the threshing machine.

Six plots were also sown with Banner Oats using different quantities of seed per acre to ascertain what effect this might have on the crop.

Oats.—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
Golden Tartarian	Aug. 20	124	40	Medium	11	Sided	6,280	103	18	35⅜	Slightly.
Black Beauty	" 20	124	48	Stiff	11	Branching	5,700	101	6	36¼	None.
Wide Awake	" 19	123	36	Slender.	7	"	5,560	100	..	35¼	"
Holland	" 20	124	52	Stiff	9	Sided	6,400	97	2	36	"
Buckbee's Illinois	" 20	124	48	Medium	11	Branching	6,000	95	10	35	"
Lincoln	" 16	120	48	Stiff	8	"	5,200	94	24	34½	"
Holstein Prolific	" 20	124	36	"	8	"	6,720	94	4	35	"
White Schonen	" 16	120	42	Medium	8	"	6,320	93	18	34½	"
Early Golden Prolific	" 19	123	40	"	10	"	5,200	93	8	36¼	"
Salines	" 16	120	42	"	6	"	6,200	92	32	36¼	"
Hazlett's Seizure	" 20	124	42	"	9	"	6,600	91	26	35½	"
Salzer's Big Four	" 21	125	36	"	8	"	3,600	91	26	34½	Slightly.
Cream Egyptian	" 20	124	42	Stiff	9	"	5,720	91	6	35½	"
Danish Island	" 22	126	48	"	9	"	6,440	91	6	35	None.
King	" 21	125	42	"	10	"	6,600	90	..	34⅜	Slightly.
Brandon	" 16	120	36	"	8	Sided	3,400	89	14	34⅜	None.
Abyssinia	" 21	125	42	Medium	9	Branching	6,400	89	4	34⅜	"
Early Gothland	" 16	120	36	Stiff	9	"	5,880	89	4	36½	"
Russell	" 20	124	42	"	9	"	6,240	88	8	36	"
Master	" 22	126	40	"	10	"	6,000	87	22	35	"
Early Blossom	" 14	118	42	Medium	9	Sided	5,040	87	2	34	"
American Triumph	" 21	125	48	Stiff	8	Branching	6,080	86	26	35	"
Oderbruch	" 16	120	42	Medium	8	Sided	6,400	86	16	34	"
White Russian	" 16	120	42	Stiff	8	Branching	4,240	85	30	35	"
Olive	" 16	120	40	"	7	Sided	4,000	85	10	34	"
White Giant	" 16	120	44	"	7	"	4,480	82	12	34	"
California Prolific Black	" 19	123	42	Medium	8	"	6,400	81	26	34	Slightly.
Early Archangel	" 21	125	40	"	8	Branching	4,200	81	6	34	None.
Tartar King	" 20	124	46	Stiff	9	Sided	4,040	80	20	34½	"
Abundance	" 16	120	36	Medium	8	Branching	6,400	80	..	34	"
Oxford	" 16	120	42	"	9	"	6,200	80	..	34	"
Scotch Potato	" 20	124	40	"	9		5,200	78	28	34	"
Improved Ligowo	" 20	124	46	Stiff	8	Branching	4,660	78	18	35	"
New Zealand	" 16	120	38	Medium	8	Sided	4,800	78	8	34	"
Bonanza	" 21	125	42	"	9	Branching	6,200	77	22	35	"
Golden Beauty	" 21	125	48	Weak	9	"	5,600	77	22	34	"
Banner	" 14	118	44	Medium	10	"	3,360	77	12	34½	"
Prolific Black Tartarian	" 14	118	38	Weak	10	Sided	4,000	77	2	35	"
Pioneer	" 14	118	40	Medium	10	Branching	5,800	75	..	34½	"
Siberian	" 20	124	36	Weak	8	"	6,480	74	4	34	Slightly.
Pense	" 14	118	48	Stiff	7	Sided	5,920	74	4	34	None.
Goldfinder	" 20	124	40	Medium	9	"	4,200	73	8	34	Slightly.
Golden Giant	" 16	120	36	"	7	"	4,480	72	32	34	None.
American Beauty	" 16	120	42	Stiff	10	Branching	4,400	72	22	34½	"
Black Mesdag	" 8	112	48	Medium	10	"	3,200	72	12	35	"
Milford	" 16	120	30	Weak	7	Sided	5,200	72	12	35½	"
Bavarian	" 14	118	40	Stiff	9	Branching	6,000	71	26	34½	"
Thousand Dollar	" 16	120	42	"	9	"	4,400	71	6	34	"
Improved American	" 16	120	42	"	8	"	4,320	70	20	34	"
Flying Scotchman	" 14	118	38	"	11	"	4,280	70	..	35½	"
Longhoughton	" 20	124	40	"	9	"	5,200	69	14	36	"
Wallis	" 14	118	48	Medium	6	"	3,680	68	28	34	"
Waverley	" 14	118	44	Stiff	9	"	4,720	68	18	35	"
Cromwell	" 16	120	42	Medium	6	"	4,640	68	8	34½	"
Mennonite	" 14	118	38	"	8	"	5,120	68	8	34	"
Miller	" 16	120	36	Weak	6	"	4,640	67	32	34	"
Rosedale	" 16	120	36	Medium	6	"	4,240	67	32	35	"
Joanette	" 14	118	36	Weak	9	"	5,000	67	2	34	"
Early Maine	" 14	118	42	Medium	8	"	4,880	66	16	34	"
Kendal	" 16	120	42	"	8	Sided	3,560	66	6	35½	"
Columbus	" 16	120	42	Stiff	9	Branching	4,800	65	30	35	Slightly.
Sensation	" 14	118	40	"	8	"	4,880	63	18	34	None.
Newmarket	" 16	120	36	Medium	6	"	4,240	62	12	34	"

OATS.—Effect of using different quantities of seed per acre.

Name of Variety.	Seed per Acre.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
	Bush.				Ins.		Ins.		Lbs.	Bu. Lbs.
Banner	1½	April 30	August 15	107	39	Medium. .	7	Branching. .	4,640	65 30
"	2	" 30	" 15	107	39	" ..	7	" ..	5,040	70 20
"	2½	" 30	" 15	107	39	" ..	7	" ..	5,440	69 14
"	3	" 30	" 15	107	39	" ..	7	" ..	5,680	80 00
"	3½	" 30	" 15	107	39	" ..	7	" ..	5,400	72 32
"	4	" 30	" 15	107	39	" ..	7	" ..	5,040	71 26

EXPERIMENTS WITH BARLEY.

Fifty-two varieties of barley have been under trial, 22 of which were two-rowed sorts and thirty six-rowed.

They were all sown at the rate of two bushels per acre April 17, on plots of one-fortieth of an acre with seed from heads selected from the experimental plots of the previous year. The soil was a gravelly loam and fairly uniform.

Four plots of two-rowed and the same number of six-rowed varieties were sown with unselected, but carefully cleaned seed. When the barley was nearly ripe there were a few days of bright, hot sunshine which ripened the plots nearly all together, but an improvement in the appearance of the crops from selected seed over the ordinary seed was apparent from the time all were headed out. There was no rust on any of the plots.

Six plots alongside were sown with Mensury to compare the results from using different quantities of seed per acre.

TWO-ROWED BARLEY.—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Ins.		Ins.	Lbs.	Bu.	Lbs.	Lbs.
Beaver	August 7	112	42	Stiff.	3	7,600	61	2	48¾
Prize Prolific	" 14	119	40	"	4	6,200	59	8	48¼
Standwell	" 12	117	44	"	3½	5,920	55	40	49
Leslie	" 10	115	46	"	3¾	5,600	52	46	48¾
Nepean	" 10	115	46	Medium. .	3½	5,600	52	24	49
Newton	" 8	113	42	" ..	3	5,280	51	42	48
French Chevalier	" 13	118	42	" ..	4	4,080	51	42	49½
Logan	" 6	111	43	" ..	3	5,840	51	12	48¼
Harvey	" 6	111	42	" ..	3½	5,480	51	2	48½
Kinver Chevalier	" 12	117	40	" ..	4¼	4,120	50	40	48½
Bolton	" 7	112	42	Stiff.	3	6,840	50	40	49
Jarvis	" 6	111	40	Weak	3½	5,680	50	40	48¼
Canadian Thorpe	" 10	115	42	Medium. .	3	3,400	50	20	49
Dunham	" 7	112	41	Stiff.	3½	5,880	50	..	48
Kirby	" 7	112	42	Medium. .	3	5,720	47	24	48½
Danish Chevalier	" 10	115	36	Stiff.	3½	3,000	47	4	48
Gordon	" 8	113	46	"	3	4,600	46	32	49½
Clifford	" 6	111	42	"	3½	3,920	46	22	48½
Victor	" 10	115	38	Medium. .	3½	4,980	45	40	48
Fulton	" 7	112	44	Stiff.	3	3,200	38	16	48
Sidney	" 12	117	40	"	3½	3,480	37	44	48
Invincible	" 13	118	40	"	3½	3,600	34	8	48

SIX-ROWED BARLEY.—TEST OF VARIETIES.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
			Inches.		Ins.	Lbs.	Bush. Lbs	Lbs.
Royal	Aug. 5	110	38	Medium	3	5,920	67 24	49
Nugent	" 8	113	44	Stiff	2½	6,280	61 12	48¾
Common	" 8	113	38	"	2	5,480	60 40	48
Claude	" 7	112	42	"	3	6,440	60 40	48½
Mensury	" 5	110	44	"	3½	7,000	59 28	48½
Mansfield	" 10	115	44	"	3	4,880	59 18	48
Odessa	" 8	113	38	Medium	2½	6,040	59 8	48
Yale	" 8	113	40	Stiff	2½	5,280	58 36	48½
Empire	" 6	111	46	"	3	5,480	58 26	48½
Argyle	" 8	113	42	"	2½	5,320	58 16	48
Blue Long Head	" 7	112	40	"	3	5,280	57 4	48¾
Petschora	" 3	108	36	"	3	4,800	55 20	48
Rennie's Improved	" 5	110	38	Medium	2½	5,780	54 28	48¾
Excelsior	" 2	107	40	Stiff	2	5,320	54 28	48½
Albert	" 8	113	40	"	2½	5,960	54 28	48
Baxter	" 3	108	37	Medium	2½	4,840	53 32	48½
Phœnix	" 5	110	40	"	2½	5,480	52 46	48½
Brome	" 8	113	40	Stiff	3	5,440	52 16	48½
Pioneer	" 5	110	40	"	3	5,640	52 16	48
Oderbruch	" 2	107	42	Medium	3	4,520	51 44	48
Champion	" 2	107	38	Stiff	2½	4,840	51 4	48
Trooper	" 8	113	34	Weak	2	5,640	50 40	48
Success	" 2	107	36	"	2½	6,200	50 30	48
Stella	" 8	113	42	Medium	3	6,020	47 14	48
Vanguard	" 5	110	40	"	3½	5,360	47 14	48
Garfield	" 7	112	40	"	2	4,880	47 4	48
Summit	" 6	111	40	"	3	5,080	47 4	48
Surprise	" 8	113	36	Weak	2½	5,040	45 40	48
Hulless Black	" 5	110	34	"	2½	5,000	45 20	60
Hulless White	" 5	110	40	Stiff	2½	4,520	45 ..	60

BARLEY.—Test of Varieties grown from Screened Seed on plots of one-fortieth acre.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.
				In.		In.	Lbs.	Bush. Lbs.
Six-rowed—								
Mensury	April 17	Aug. 6	111	44	Stiff	3	5,840	56 38
Nugent	" 17	" 8	113	44	"	3	6,400	58 28
Champion	" 17	" 2	107	38	"	2	3,480	49 26
Mansfield	" 17	" 10	115	42	"	3½	4,480	57 8
Two-rowed—								
Sidney	April 17	Aug. 12	117	40	"	3½	3,480	36 40
Canadian Thorpe	" 17	" 10	115	40	"	3	3,200	50 ..
Nepean	" 17	" 10	115	44	"	3½	5,600	51 32
Kinver Chevalier	" 17	" 12	118	42	"	4	3,880	50 20

BARLEY, SIX-ROWED.—Results of using different quantities of seed per acre on plots of one-fortieth acre each.

Name of Variety.	Seed per Acre.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Bush.				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
Mensury.....	1½	April 30	Aug. 10	102	40	Stiff and bright..	3 to 3½	4,000	43	16	49
"	2	" 30	" 10	102	40	" ..	3 " 3¾	4,400	48	16	49
"	2½	" 30	" 9	101	44	" ..	3 " 3½	5,600	55	40	49
"	3	" 30	" 9	101	44	" ..	3 " 3½	5,480	62	8	49
"	3½	" 30	" 8	100	44	" ..	3 " 3½	5,400	56	2	48
"	4	" 30	" 8	100	38	" ..	3 " 3½	3,480	46	32	48

EXPERIMENTS WITH SPRING WHEAT

Seventy-one varieties of spring wheat were tested this year on plots of one-fortieth of an acre each. The soil was a sandy loam, which was in clover the previous year. It was fall ploughed and thoroughly prepared in spring with a spading-harrow and smoothing-harrow. Most of the plots were sown with seed from heads selected from the plots the previous harvest. Eleven plots were sown alongside with screened seed saved from the produce of the plots when harvested without selection.

All the plots got a dressing of superphosphate of lime at the rate of one hundred pounds per acre, applied broadcast, when the plants were well above ground.

Six plots were sown with one variety of seed, to test the results of using different quantities of seed per acre. All were sown the same day and in every way the conditions were the same. The two plots with the heaviest seeding ripened a little sooner but in both cases the straw was weak and lodged.

SPRING WHEAT.—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
Roumanian'.....	April 16..	Aug. 20 .	126	48	Stiff.....	3	Bearded..	7,220	52	..	60½
Ebert	" 16..	" 14..	120	42	"	2½	Beardless.	6,440	51	30	60¾
Blair	" 16..	" 19..	125	36	Medium..	3½	" ..	7,440	51	10	61
Stanley.....	" 16..	" 20..	126	42	Stiff.....	3	Bearded..	7,000	50	40	60½
Countess..	" 16..	" 17..	123	42	" . ..	2½	Beardless.	6,360	50	40	60
Hastings.....	" 22..	" 19..	119	44	Medium..	3½	" ..	6,600	50	..	61
Chester	" 22..	" 17..	117	42	" ..	3½	" ..	7,520	49	20	60¾
Cartier	" 22..	" 17.	117	40	" ..	3	Bearded..	6,800	48	40	61¼
Australian No. 9.....	" 22..	" 18..	118	44	Stiff.....	3	Beardless.	6,720	48	40	61¼
Essex..	" 22..	" 19..	119	48	"	4	" ..	7,000	47	20	61¼
Crawford..	" 16..	" 13..	119	41	Medium..	3	Bearded..	6,480	47	20	60
Captor	" 16..	" 19..	125	42	Stiff.....	3	Beardless.	6,800	47	..	60¼
Minnesota No. 169 ..	" 16..	" 19..	125	48	"	3	" ..	7,000	46	40	61¼
Alpha..... . ..	" 16..	" 19..	125	48	"	4	" ..	6,520	46	40	60¾
Australian No. 23.....	" 22..	" 18..	118	50	Medium..	5	" ..	6,200	46	30	60¼
Early Riga..	" 22..	" 13..	118	42	" ..	3	" ..	5,840	46	20	61¼
Dufferin.....	" 22..	" 13..	118	43	Stiff.....	3½	Bearded..	6,600	46	10	60
Australian No. 19.....	" 22..	" 19..	119	48	"	3	Beardless.	6,600	45	20	60
Laurel.....	" 16..	" 20..	126	48	"	3	" ..	5,920	45	20	60

SPRING WHEAT.—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
				In.		In.		Lbs.	Bush. Lbs.	
Cassel	Apr. 22..	Aug. 21..	121	46	Medium .	3½	Beardless.	5,160	44 50	60
Colorado..	" 16..	" 16..	122	42	Stiff.....	3¼	Bearded..	4,560	44 40	61
Vernon	" 16..	" 13..	119	42	"	3	" ..	5,000	44 40	60
Red Fern	" 16..	" 20..	126	48	"	3	" ..	2,400	44 40	60
Hungarian	" 16..	" 20..	126	42	Medium..	2¼	" ..	5,800	44 40	61
Australian No. 25	" 22..	" 17..	117	46	Stiff... ..	4½	Beardless.	4,040	44 40	60½
Benton	" 22..	" 16..	116	46	Medium..	4	" ..	5,120	44 30	60
Huron	" 16..	" 19..	125	46½	Stiff.....	3	Bearded..	6,400	44 20	60½
Preston	" 16..	" 17..	123	40	"	3	" ..	5,200	44 ..	60
Robin's Rust Proof	" 22..	" 17..	117	50	"	3¼	Beardless.	5,480	43 20	60½
Advance	" 16..	" 13..	118	46	"	3	Bearded..	5,360	43 20	59½
Minnesota No. 181	" 16..	" 20..	126	42	"	3	Beardless.	6,000	43 ..	61
Pringle's Champlain	" 16..	" 19..	125	38	"	3	Bearded..	5,440	42 20	59¾
Red Swedish	" 16..	" 17..	123	38	Medium..	4	" ..	4,600	42 20	61
Bishop	" 22..	" 20..	120	46	Stiff.....	3½	Beardless.	6,200	42 ..	60½
Beauty	" 16..	" 17..	123	42	"	3½	" ..	5,360	42 ..	61
Minnesota No. 149	" 16..	" 20.	126	36	"	2½	" ..	6,200	41 40	61
Fraser.	" 16..	" 12..	118	41	Medium..	3	Bearded..	3,520	41 40	61½
Ladoga	" 16..	" 12..	118	42	Stiff.....	3½	" ..	5,800	41 20	60
Weldon	" 16.	" 16..	122	42	Medium..	3	Beardless.	4,400	41 20	61
Plumper	" 16..	" 20..	126	42	" ..	3½	Bearded..	5,200	41 20	60
Admiral	" 16..	" 19..	125	48	Stiff.....	3½	Beardless.	5,200	41 20	61
Australian No. 10	" 22..	" 16..	116	48	Stiff..	4	" ..	5,120	40 40	60
Red Fife	" 16..	" 17..	123	40	"	2¾	" ..	4,640	40 30	61½
Mason	" 16 .	" 19..	125	36	Weak ...	2½	" ..	5,000	40 20	60
Japanese	" 22..	" 19..	119	38	Medium..	3	Bearded..	5,600	40 10	59½
White Fife	" 16..	" 17..	123	42	" ..	3	Beardless.	5,040	40 ..	60
Australian No. 13	" 22..	" 17..	117	48	" ..	3½	" ..	5,000	39 40	61
Angus	" 22..	" 15..	115	44	" ..	4	" ..	4,480	39 40	60
Crown	" 16..	" 19 .	125	48	Stiff..	4	Bearded..	5,720	39 40	60
Australian No. 27	" 22..	" 17..	117	46	"	3½	Beardless.	5,120	39 40	60
Speltz	" 16..	July 29..	104	33	Medium..	2	Bearded..	3,440	39 30	40½
Dawn	" 16..	Aug. 17..	123	42	Stiff..	2½	Beardless.	5,280	39 20	60½
Progress	" 16..	" 19..	125	39	Medium..	3	" ..	5,160	39 10	59
Minnesota No. 163	" 16..	" 20..	126	36	" ..	3	" ..	4,600	38 40	60
Norval	" 16..	" 10..	116	38	" ..	3	Bearded..	3,360	38 20	60
Campbell's White Chaff	" 16..	" 19..	125	36	" ..	3	Beardless.	5,320	38 10	59½
White Russian	" 16..	" 20..	126	42	Stiff..	3	" ..	5,120	38 ..	60
Blenheim	" 16..	" 17..	123	42	"	2½	Bearded..	4,680	38 ..	60
Goose	" 16..	" 20..	126	36	Medium..	2½	" ..	4,480	37 40	61
Monarch	" 16.	" 20..	126	40	" ..	3	Beardless.	3,920	37 20	60
Herisson Bearded	" 16..	" 19..	125	38	" ..	2	Bearded..	4,520	37 ..	60
White Connell	" 16..	" 20..	126	36	" ..	2	Beardless.	4,480	36 40	60
Percy	" 16..	" 17..	123	42	" ..	2½	" ..	4,560	37 ..	60
Dion's	" 16..	" 17..	123	38	" ..	3	Bearded..	4,320	36 40	60
Rideau	" 16..	" 13..	119	44	" ..	2½	Beardless.	3,600	36 20	60½
Wellman's Fife	" 16..	" 19..	125	36	" ..	2½	" ..	5,120	36 20	60
Clyde	" 16..	" 20..	126	40	Stiff..	3	" ..	3,720	36 ..	60½
Rio Grande	" 16..	" 16..	122	42	Slender...	3	Bearded..	5,040	35 40	60
Harold	" 16..	" 10..	116	40	Weak	3½	" ..	4,080	35 20	59
Byron	" 16..	" 13..	119	40	"	3¼	" ..	5,120	34 ..	60
Beaudry	" 16..	" 17..	123	48	Stiff..	3	" ..	4,800	31 ..	59

SPRING WHEAT.—Test of varieties grown from screened seed.

Name of Variety.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Countess	Apl. 16..	Aug. 21..	127	40	Stiff & bright	2	Beardless.	6,000	44	40	60
Stanley	" 16..	" 22..	128	40	" "	3	Bearded..	5,200	43	20	60 4/5
Captor	" 16..	" 19..	125	42	" "	3	Beardless.	6,200	41	40	60 4/5
Blenheim	" 16..	" 19..	125	40	" "	2 3/4	Bearded..	4,320	41	20	60
Red Fife	" 16..	" 18..	124	36	" "	2 1/2	Beardless.	3,600	39	30	61
Campbell's White Chaff.	" 16..	" 19..	125	35	Medium	3	" ..	3,400	39	20	60
Red Swedish	" 16..	" 18..	124	39	"	3 1/2	Bearded..	4,120	38	20	61
Goose	" 16..	" 21..	127	34	"	2 1/2	" ..	6,000	38	..	60
Mason	" 16..	" 19..	125	38	Weak	2	Beardless.	3,400	35	20	60
Dufferin	" 16..	" 14..	120	40	Stiff & bright	3	Bearded..	3,480	28	..	60
Crown	" 16..	" 20..	126	48	" "	4	" ..	4,080	26	..	61

SPRING WHEAT.—Results of using different quantities of seed per acre.

Name of Variety.	Seed per Acre.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	
	Bush.				In.		In.	Lbs.	Bush.	Lbs.
Percy	3/4	Apl. 30..	Aug. 19..	111	40	Stiff & bright.	2 1/2	4,480	34	40
"	1	" 30..	" 19..	111	42	" " ..	2 3/4	4,800	36	
"	1 1/2	" 30..	" 19..	111	42	" " ..	2 1/2	5,200	37	20
"	2	" 30..	" 19..	111	40	" " ..	2 1/2	4,960	36	40
"	2 1/2	" 30..	" 17..	109	40	Weak	2	4,800	34	20
"	3	" 30..	" 17..	109	40	"	2	4,320	40	20

Plots five and six were lodged as the straw was slender and soft and the heads shorter.

EXPERIMENTS WITH PEASE.

Fifty-nine varieties of pease were tested this year, side by side, in plots of one-fortieth of an acre each. The soil was a gravelly loam which had only been once cropped since it was cleaned, and a great many ferns grew on it, which to some extent, lessened the yield. Their presence in the straw partly accounts for the heavy gross yield. The straw was clean and bright, the season was favourable for pease and the yield is a fairly good average one. All the plots were sown April the 15th, but the cold weather in May and June increased the number of days to mature considerably beyond the average.

Pease.—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
				Inches.	Lbs.	Inches.		Bush.	Lbs.	Lbs.
English Grey	Aug. 21.	128	Rank.	60	8,000	2½	Large	64	..	61¾
Harrison's Glory	" 22.	129	"	74	6,200	3½	"	60	40	62
Duke	" 23.	130	Strong.	66	7,120	2½	"	60	..	61½
Early Britain	" 15.	122	Rank.	56	8,960	3½	"	59	20	61¾
Pride	" 23.	130	"	60	8,200	2	"	59	20	62
Fergus	" 26.	133	Strong.	48	7,040	2	Small	59	..	63
Mackay	" 21.	128	Medium	66	7,760	2½	"	58	50	61
Arthur	" 20.	127	Strong.	48	6,400	2	Large	57	50	60½
New Potter	" 21.	128	"	78	6,720	2	"	57	20	60¾
Elephant Blue	" 19.	126	"	60	8,000	2	Medium	57	..	61¼
Agnes	" 24.	131	"	74	6,200	3¼	Large	56	50	61½
Prince Albert	" 21.	128	"	54	6,680	2½	Small	56	40	61
Perth	" 23.	130	"	48	7,600	2½	"	56	..	60¾
Large White Marrowfat	" 24.	131	"	54	5,920	2	"	55	20	61
Gregory	" 19.	126	"	60	6,400	2½	Medium	55	..	61½
White Wonder	" 24.	131	"	66	6,480	2	"	54	20	61¼
Nelson	" 16.	123	"	60	8,320	3	"	54	..	62
Prince	" 20.	127	"	42	6,400	2	Large	54	..	61½
Trilby	" 20.	127	Rank.	84	6,800	2½	Medium	52	50	60¾
Elder	" 23.	130	Medium	60	6,300	2	"	52	40	61
Crown	" 21.	128	Rank.	54	7,360	2	Small	52	30	61
Bruce	" 20.	127	Strong.	52	7,040	2½	Large	52	30	60
Carleton	" 23.	130	Rank.	96	8,000	2½	Medium	52	20	60
Picton	" 24.	131	Strong.	60	7,600	2	"	52	10	60
Kent	" 26.	133	"	54	8,400	2	Large	52	..	60½
German White	" 21.	128	"	54	5,200	2½	Medium	52	..	61
Alma	" 20.	127	"	60	9,400	2½	Small	51	20	60
Centennial	" 24.	131	"	60	7,040	2	Medium	50	40	61
French Canner	" 21.	128	"	60	5,200	2½	"	50	..	61½
Vincent	" 20.	127	"	60	6,320	2½	Large	49	50	60
Paragon	" 23.	130	"	62	6,480	2½	Medium	49	40	62
Lanark	" 23.	130	"	42	8,360	2½	Large	49	20	61½
Prussian Blue	" 19	126	Medium	54	7,600	2	Medium	48	40	62
Creeper	" 15.	122	"	60	4,800	3	Small	48	40	61
Golden Vine	" 26.	133	Rank.	66	5,600	2½	"	48	20	61½
Daniel O'Rourke	" 15.	122	Medium	60	7,920	2½	"	48	10	62
Pearl	" 23.	130	Very rank.	102	6,720	2½	Large	48	..	60
Chancellor	" 23.	130	Strong.	66	5,840	2	Medium	48	..	61
Wisconsin Blue	" 26.	133	"	72	5,600	2½	Small	47	40	62½
King	" 24	131	"	54	5,920	2½	Large	47	20	60½
Cooper	" 23.	130	Medium	54	7,600	3	"	47	10	60
Blk. Eyed Marrowfat	" 20.	127	Strong.	54	6,800	2½	"	47	10	60
Victoria	" 20.	127	"	58	8,200	2½	Small	47	..	61½
Herald	" 23.	130	"	66	6,720	2	Large	46	40	60
Multiplier	" 24.	131	"	66	5,360	2	Small	46	30	62½
Archer	" 24.	131	"	60	7,600	1½	Medium	45	20	60½
Bedford	" 24.	131	"	56	8,040	2	"	44	40	60
Mummy	" 24.	131	"	48	7,920	2	"	44	..	61
Elliot	" 26.	133	"	66	6,160	2	Small	42	20	62½
Macoun	" 23.	130	"	60	6,840	2	Large	42	..	60½
Fergus	" 26.	133	"	48	7,060	2	Small	42	..	60½
Oddfellow	" 23.	130	Medium	46	6,200	3	Medium	41	20	62½
Fenton	" 16.	123	"	46	7,880	2	Large	40	20	61
Bright	" 26.	133	Strong.	52	5,160	2	Medium	39	20	61
Dover	" 23.	130	"	60	6,720	2	Large	38	40	60
Chelsea	" 21.	128	Medium	54	6,960	3	Medium	38	40	62
Canadian Beauty	" 23.	130	Strong.	60	7,040	2½	Large	37	20	60
Grass Pea	Sept. 3.	141	Poor.	36	4,160	1	Small	24	40	61½

Oats.—Tests with Fertilizers.

Six plots of Banner oats, one-fortieth of an acre each, were included in this test. The land was a gravelly loam, that had given a crop of wheat in 1900, following clover.

Plot 1.—One hundred pounds nitrate of soda per acre, one-half sown broadcast when the plants were well above the ground and the other half when they were about 6 inches high.

Plot 2.—Two hundred pounds nitrate of soda per acre ; one-half applied broadcast when the plants were well above ground and the other half when about 6 inches high.

Plot 3.—Check plot no fertilizer applied.

Plot 4.—Four hundred pounds superphosphate of lime per acre, scattered broadcast and lightly harrowed before the seed was sown.

Plot 5.—Four hundred pounds muriate of potash per acre ; sown broadcast and harrowed before the seed was sown.

Plot 6.—Two hundred pounds superphosphate of lime, 100 pounds muriate of potash, and 100 pounds of nitrate of soda per acre. Half of the material scattered over the surface before the seed was sown and the other half when the plants were about 2 inches above ground.

All the conditions as to soil and seed were identical. All were sown April 24, using seed at the rate of 2½ bushels per acre. All the plots ripened together and were cut the same day. There was no rust on any of the plots.

Name of Variety.	Character of Straw.	Weight of Straw.	Yield per Acre.		Proportion Rusted.
		Lbs.	Bush.	Lbs.	
Banner, Plot 1—Nitrate of soda, 100 lbs. per acre....	Medium. ...	4,600	58	28	None.
" " 2— " 200 "	" ...	5,000	62	12	"
" " 3—No fertilizer.....	Weak	3,800	54	4	"
" " 4—Superphosphate, 400 lbs. per acre...	Stiff.... ...	5,400	68	28	"
" " 5—Muriate of potash, 400 lbs. per acre.	"	4,600	74	12	"
" " 6—Superphosphate, 200 lbs. ; muriate of potash, 100 lbs. ; nitrate of soda, 100 lbs. per acre.....	"	5,800	82	32	"

Pease.—Tests with Fertilizers.

Four plots of pease, of one-twentieth of an acre each, were sown April 15, and when the plants were about 2 inches above ground nitrate of soda, at the rate of 100 pounds per acre, was scattered broadcast over the plot, and when they were about 6 inches high another 100 pounds was applied as before.

The soil was a very gravelly loam, that was first broken up in the winter of 1899 and 1900, and pease sown in spring of 1900, but they were destroyed by cutworms. This year the vines grew very rank in each case and were extra well podded. The results are given in the following table :—

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per Bush.
					In.	In.	Bush.	Lbs.	Lbs.
King.....	April 15..	Aug. 24..	131	Rank... .	60	3	106	20	61½
German White..	" 15..	" 21..	128	"	58	3	102	..	62
Perth	" 15..	" 23..	130	"	56	3¼	94	40	61
Centennial.....	" 15..	" 24..	131	" . .	66	2¾	90	40	61

POTATOES.—TESTS WITH FERTILIZERS.

Experiment was also made to test the value of nitrate of soda and superphosphate of lime applied to potatoes.

The land chosen was some of the oldest on the farm and may be considered fairly uniform in character and condition. It was in clover last year and the clover sod was ploughed under for the potato crop.

The results show, as do most experiments of similar nature, that where a clover stubble is turned under in a short rotation, nitrogen in plenty, for the crop is already in the land. There were no rotten potatoes in any of the plots.

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Dakota Red, Plot 1—Nitrate of soda, 100 lbs. per ac.	633	36	633	36	538	36	95	
" " 2— " 150 " ..	644	36	644	36	548		96	36
" " 3— " 200 " ..	657	48	657	48	526		131	48
" " 4—Untreated.....	638		638		572	30	65	30
" " 5—Superphosphate, 100 lbs. per ac.	655	36	655	36	590	36	65	36
" " 6— " 150 " ..	688	36	688	36	617	6	71	30
" " 7— " 200 " ..	743	30	743	30	664		79	30

EXPERIMENTS WITH INDIAN CORN.

Thirty-three varieties of corn were planted in the test this year.

All were sown May 20 and 21. The land was clover sod, well harrowed and prepared and was in fine condition, but the weather in the last of May and all of June was cold and wet and the germination of the seed was delayed in consequence, and the growth was very slow until the middle of July. During the last half of July, all of August, September and most of October the weather was dry, bright and warm, and the corn made a fair growth, but the unfavourable weather in the beginning of the season put the growth back and it never recovered lost ground. Very few varieties made good ears of corn. All the varieties were tested both in hills and drills, the drills were three feet apart and the stalks thinned to about six inches in the drill. The hills were three feet apart each way and not more than three plants to a hill.

The yield has been calculated from two rows each, sixty-six feet long.

INDIAN CORN.—TEST OF VARIETIES.

Name of Variety.	Height.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
	Inc.						Tons.	Lbs.	Tons.	Lbs.
Mamm. 8-rowed Flint...	96	Aug. 16..	Sept. 10..	Sept. 20.	Oct. 14.	Late milk.	22	1,320	21	1,020
Thorobred White Flint..	90	" 18..	" 20..	Oct. 4.	.....	Ea. milk..	22	220	16	1,180
White Cap Yellow Dent	108	" 22..	" 20..	" 4.	.....	" ..	20	1,250	16	1,400
Early Mastodon.....	90	" 10..	" 16..	Sept. 24.	.....	Roast. ear	20	700	15	360
Compton's Early	100	" 16..	" 20..	Oct. 1.	.....	Ea. milk..	19	1,820	16	1,440
Mammoth Cuban	112	" 29..	" 20..	" 2.	.....	" ..	17	320	16	780
King of the Earliest.....	112	" 14..	" 3..	Sept. 20.	Oct. 7.	L. milk...	16	1,660	15	690
Salzer's All Gold.....	76	" 12..	" 1..	" 18.	Sept. 24.	Glazed....	15	1,680	17	210
" Superior Fodder.	106	" 28..	" 16..	Oct. 4.	.....	Ea. milk.	15	1,570	13	1,060
Selected Leaming.....	106	" 28..	" 15..	" 8.	.....	" ..	15	1,460	17	540
Pride of the North.....	108	Sept. 18..	Oct. 8..	.....	.....	Silk.....	15	1,240	16	1,000
Champion White Pearl. .	108	" 6..	Sept. 29..	Oct. 10.	.....	Ea. milk..	15	1,020	16	1,440
Extra Early Huron Dent	102	Aug. 23..	" 13..	Sept. 24.	Oct. 14.	L. milk...	15	800	13	950
Longfellow.....	96	" 10..	Aug. 26..	" 20.	" 8.	Glazed....	15	580	15	1,900
Early Butler.....	106	" 15..	" 30..	" 30.	.....	Roast. ear	15	360	15	1,460
North Dakota White....	90	" 17..	" 30..	" 28.	Oct. 16.	L. milk...	15	360	13	1,940
Red Cob Ensilage..	112	Sept. 3..	Sept. 20..	Oct. 14.	.....	Ea. milk..	14	380	16	1,770
Kendall's Early Giant...	84	Aug. 18..	Aug. 30..	Sept. 26.	Oct. 18.	L. milk...	13	1,610	7	280
Yellow Long Eared....	76	" 20..	Sept. 6..	" 16.	Sept. 28.	Glazed....	12	1,960	13	1,280
Cloud's Early Yellow...	108	" 28..	" 16..	" 28.	.....	Ea. milk..	12	1,520	12	200
Giant Prolific Ensilage..	106	" 30..	" 17..	" 30.	.....	" ..	12	1,410	12	1,080
Canada White Flint....	84	" 16..	Aug. 30..	" 22.	Oct. 14.	L. milk...	11	1,860	11	440
Evergreen Sugar.....	90	" 18..	" 30..	Oct. 16.	.....	Ea. milk..	11	1,430	10	130
Sanford.....	100	" 14..	" 26..	Sept. 18.	Oct. 18.	L. milk...	10	1,780	13	1,060
Angel of Midnight.....	84	" 22..	Sept. 18..	Oct. 10.	.....	Ea. milk..	10	1,340	10	1,890
Pearce's Prolific.....	96	" 30..	" 16..	Sept. 30.	Oct. 18.	L. milk...	10	20	9	1,140
Country Gentleman. ...	80	" 30..	" 26..	Oct. 16.	.....	Ea. milk..	9	150	6	860
North Dakota Yellow...	48	" 15..	Aug. 30..	Sept. 14.	Oct. 6.	Glazed....	8	1,160	9	1,800
Black Mexican.....	80	" 24..	Sept. 10..	" 22.	" 11.	L. milk...	7	520	7	300
Salzer's Earliest Ripe ...	48	" 16..	Aug. 28..	" 10.	" 4.	Glazed....	5	1,440	4	800
Yellow Six Weeks.....	48	" 10..	" 20..	" 4.	" 16.	Ripe	5	560	4	1,240
Mitchell's Extra Early..	48	" 2..	" 12..	Aug. 28.	" 10.	"	5	340	5	450
Early August.....	50	July 29..	" 9..	" 24.	" 6.	"	5	120	4	1,240

CORN AT DIFFERENT DISTANCES APART IN THE ROWS.

The same varieties were used in this test as were used last season.

The plants were trimmed to six inches in the drill and to three strong plants in the hill. The yield, as in previous years, is usually the heaviest where the drills or rows are at the least distance. In each case four rows of each variety were planted and the yield computed from 66 feet of the two centre rows. The plots were all planted May 20.

CORN.—AT DIFFERENT DISTANCES APART.

Name of Variety.	Date Sown.	Distance apart in Rows.	Hills.	Condition when cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
		Inches.	Inches.		Tons.	Lbs.	Tons.	Lbs.
Champion White Pearl....	May 20....	21	21	Early milk..	26	1,564	23	388
" "	" 20....	28	28	" ..	21	151	19	1,034
" "	" 20....	35	35	" ..	17	1,750	16	1,716
" "	" 20....	42	42	Late milk ..	14	838	13	400
Selected Leaming.....	" 20....	21	21	" ..	23	675	21	240
" "	" 20....	28	28	" ..	21	428	19	751
" "	" 20...	35	35	" ..	17	734	15	129
" "	" 20...	42	42	" ..	14	1,134	13	1,908
Longfellow	" 20....	21	21	. . . . .	14	1,735	15	171
"	" 20....	28	28	....	17	791	17	1,922
"	" 20....	35	35	..... .	14	285	13	249
"	" 20....	42	42	Late milk ..	13	195	12	1,958

EXPERIMENTS WITH TURNIPS.

Twenty-nine varieties of Turnips were tested. Two sowings of each sort were made, the first on May 28, and the second on June 11. All were pulled November 11. The soil was a clay loam, had been in cultivation since 1890, and had become fairly uniform. A good clover sod was turned under in spring of 1897, and another in spring of 1900, and a light dressing of stable manure given last winter which was thoroughly mixed with the soil before the seed was sown. The land was uniform and as will be seen, the yields are good.

The yields per acre have been calculated from the weight of crop gathered from two rows, each 66 feet long. The crop from the first sown plots gave a considerably higher average than that from the second sown.

TURNIPS.—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Emperor Swede	49	10	1,633	30	48	30	1,206	30
Magnum Bonum	48	1,020	1,670	..	38	1,220	1,287	..
Imperial Swede	47	380	1,573	..	42	1,140	1,419	..
East Lothian	46	1,720	1,562	..	39	510	1,309	..
Prize Purple Top	46	70	1,534	30	38	1,385	1,289	45
Hall's Westbury	45	420	1,507	..	42	1,470	1,424	30
Jumbo	45	255	1,504	15	38	1,220	1,289	45
Monarch	45	172	1,502	52	42	1,140	1,419	..
Elephant's Master	44	770	1,479	30	35	600	1,176	40
Marquis of Lorne	44	440	1,473	20	34	1,630	1,160	30
New Arctic	43	1,935	1,465	35	41	1,820	1,397	..
Skirvings	43	1,450	1,457	30	40	1,180	1,353	..
Drummond Purple Top	43	1,120	1,452	..	38	230	1,270	30
Prize Winner	43	460	1,441	..	42	1,140	1,419	..
Sutton's Champion	43	295	1,438	15	40	850	1,347	30
Carter's Elephant	42	1,305	1,421	45	42	480	1,408	..
Mammoth Clyde	41	1,820	1,397	..	39	540	1,309	..
Selected Champion	41	800	1,380	30	35	620	1,177	..
Kangaroo	40	1,840	1,364	..	45	1,080	1,584	40
Giant King	40	1,180	1,353	..	35	620	1,177	..
Hartley's Bronze	40	520	1,342	..	35	950	1,182	30
Champion Purple Top	40	350	1,339	15	39	530	1,325	30
Selected Purple Top	39	1,530	1,325	30	35	290	1,171	30
Bangholm Selected	38	1,220	1,287	..	42	1,140	1,419	..
Perfection Swede	38	1,055	1,284	15	38	230	1,270	30
Shamrock Purple Top	38	890	1,281	30	37	1,900	1,265	..
West Norfolk Purple Top	37	1,570	1,259	30	29	1,730	995	30
Halewood's Bronze Top	35	1,128	1,171	20	38	1,055	1,284	35
Webb's New Renown	34	1,960	1,166	..	38	65	1,267	45

EXPERIMENTS WITH MANGELS.

Twenty-four varieties of Mangels were tested this year. The soil was a loam mixed sandy and clay, and had only produced one crop since breaking up. After breaking up a good deal of levelling was necessary and as a consequence the condition was not uniform nor the stand even. Two plots of each variety were sown, the first on April 26, and the second on May 10. All were pulled on November 6. Four rows, each one hundred feet long, of each sort was sown at each sowing and the yield was computed from the two centre rows, each 66 feet long.

MANGELS.—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Giant Yellow Intermediate	26	120	902		23	530	775	30
Mamm. Yellow Intermediate	24	840	814		21	570	709	30
Lion Yellow Intermediate	22	1,000	750		20	95	668	15
Yellow Intermediate	21	1,065	717	25	19	610	643	30
Warden Orange Globe	20	920	682		19	940	649	
Prize Winner Orange Globe	20	460	674	20	14	1,865	497	40
Champion Yellow Globe	20	95	668	15	19	280	638	
Yellow Fleshed Tankard	19	1,930	665	30	17	320	572	
Norbiton Giant	19	1,600	660		17	1,640	594	
Selected Mamm. Long Red	19	1,435	657	15	21	240	704	
Mammoth Oval Shaped	19	775	646	15	21	590	709	50
Giant Yellow Globe	19	280	638		16	670	544	30
Half Long Sugar White	17	1,640	594		15	360	506	
Prize Mamm. Long Red	17	320	572		16	1,000	550	
Mammoth Long Red	16	1,660	561		16	1,990	566	
Gate Post	16	1,165	552	45	17	1,640	594	
Giant Yellow Half Long	16	1,085	551	35	17	1,475	591	15
Leviathan Long Red	16	835	547	15	15	690	511	30
Triumph	16	340	539		17	320	572	
Gate Post Yellow	15	1,020	517		13	400	440	
Half Long Sugar Rosy	15	360	506		14	1,700	495	
Golden Fleshed Tankard	13	730	445	30	17	980	583	
Canadian Giant	12	1,740	429		16	1,330	555	30
Ward's Large Oval Shaped	9	480	308		11	1,430	390	30

The seed of the Red Fleshed Tankard failed to germinate.

EXPERIMENTS WITH CARROTS.

Twenty varieties of carrots were tested this year. They were sown alongside of the mangels, and the soil and conditions were in every respect similar. Two plots of each sort were sown, in drills 2 feet apart, the first series of plots were sown April 25 and the second on May 9, and all pulled November 5. As in previous years the stump rooted sorts gave the best yield and are more desirable because easier to pull and less liable to break in handling. The yield is computed from 66 feet of the two centre rows in each plot.

CARROTS.—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Improved Short White	30	1,220	1,020	20	25	637	843	57
Iverson's Champion	30	720	1,012		30	390	1,006	30
Giant White Vosges	28	1,585	959	45	28	740	979	
Ontario Champion	28	100	935		26	1,130	885	30
Green Top White Orthe	27	1,440	924		28	1,585	959	45
Mamm. White Intermediate	27	1,110	918	30	25	1,974	866	14
Carter's Orange Giant	26	1,130	885	30	26	635	871	35
Yellow Intermediate	26	1,046	884	26	21	240	704	
Early Gem	26	800	880		21	1,548	725	48
New White Intermediate	25	1,263	854	23	26	140	869	
Half Long White	25	490	841	30	28	1,585	959	45
Long Yellow Stump Rooted	23	1,520	792		25	1,314	855	14
Scarlet Intermediate	23	1,468	791	8	21	240	704	
White Vosges, Large Short	21	1,230	720	30	24	1,500	825	
Half Long Chantenay	20	920	682		20	1,580	693	
Long Scarlet Altringham	20	590	676	30	19	1,930	665	30
White Belgian	19	1,765	662	45	24	1,181	819	41
Guerande or Ox-Heart	17	1,640	594		18	1,143	619	3
Long Orange or Surrey	14	1,040	484		13	1,720	462	
Scarlet Nantes	13	1,573	459	23	13	70	434	30

EXPERIMENTS WITH SUGAR BEETS.

Seven varieties of sugar beets were tested alongside of the carrots and mangels and under similar conditions. Two sowings were made of each sort, the first on April 26 and the second on May 10, and all were pulled November 6. The yields are not heavy and they have not been as profitable to raise for feeding here as mangels or carrots, because of the lighter yield and being more difficult to harvest. They are often rooty and the growth is nearly all underground. Four rows of each sort were sown and the yield computed from 66 feet of each of the two centre rows.

SUGAR BEETS.—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Improved Imperial	16	1,990	566	30	13	1,720	462	10
Danish Red Top	16	1,330	555	30	17	980	583	
Royal Giant	16	1,165	552	45	17	816	580	16
Vilmorin's Improved	13	1,060	451		14	1,700	495	
Red Top Sugar	13	400	440		15	30	500	30
Danish Improved	11	441	374		12	420	407	
Wanzleben	9	480	308		9	150	302	30

EXPERIMENTS WITH POTATOES.

Ninety varieties of potatoes were planted, May 8 and 9, on clay loam, which had been given about twenty wagon loads per acre of barnyard manure in the spring of 1900. This had been worked well into the soil with spading-harrow and drag and a crop of oats grown that year. As soon as the oats were harvested the land was well harrowed to start weed seeds and shed grain and ploughed late in the fall. In spring it was well stirred and mixed by use of the spading-harrow and drag, and the potatoes planted in drills 2½ feet apart. The spring was wet and cold but the seed germinated well and the stand was even throughout. The yield is a very good one and the quality all that could be desired. Except a few rows left as check rows, all were sprayed with Bordeaux mixture to prevent injury by blight; but those untreated remained healthy until ripened as there was no blight this season. Four rows of each sort were planted and the yield per acre calculated from two centre rows, 66 feet long. There was very little rot this year and the crop throughout was very even and fine.

Potatoes.—Test of Varieties.

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Uncle Sam	686	24	686	24	None		617	46	68	38	Round white.
Dakota Red	682		682		"		613	48	68	12	Long red.
Polaris	677	36	677	36	"		576		101	36	" white.
Vanier	675	24	675	24	"		573	46	101	38	" dark red.
Money Maker	673	12	673	12	"		605	52	67	20	" white.
Swiss Snowflake	673	12	673	12	"		605	52	67	20	Round "
American Giant	662	12	662	12	"		596		66	12	Long "
McIntyre	660		660		"		429		231		" pink.
Holborn Abundance	651	12	651	12	"		553	42	97	30	Round white.
Vick's Extra Early	633	36	633	36	"		506	56	126	40	" pale rose.
Bovee	629	12	629	12	"		534	50	94	22	Long rose.
New Variety No. 1	629	12	629	12	"		566	17	62	55	Round pale rose.
Seedling No. 230	624	48	624	48	"		468	36	156	12	" white.
Rochester Rose	622	36	622	36	"		497	47	124	52	Long rose.
Seedling No. 7	618	12	618	12	"		556	24	61	48	" red.
Northern Spy	616		616		"		492	48	123	12	" pink.
Lee's Favorite	614	54	614	54	"		522	40	92	14	" rose.
Hale's Champion	613	48	613	48	"		429	40	184	8	Round white.
Prize Taker	613	48	613	48	"		460	21	153	27	" red.
Clay Rose	613	48	613	48	"		552	26	61	22	Long rose.
Reeves' Rose	608	48	608	48	"		548		60	48	" "
Burnaby Seedling	607	12	607	12	"		546	20	60	42	" "
Flemish Beauty	606	12	606	12	"		424	24	181	48	" flat rose.
Empire State	594		594		"		475	12	118	48	" pink white.
Early Puritan	592	54	592	54	"		504	12	88	42	" white.
Columbus	589	36	589	36	"		501	11	88	25	" flat rose.
Carman No. 3	585	12	585	12	"		497	18	87	54	Oblong white.
Irish Daisy	580	48	580	48	"		348	28	232	20	Round white.
Quaker City	574	12	574	12	"		516	48	57	24	Flat "
Sabean's Elephant	569	48	569	48	"		484	24	85	27	" long white.
Daisy	558	48	558	48	"		391		167	48	Long pink and white.
Late Puritan	556	36	507		55	36	390		111		" "
Troy Seedling	554	24	554	24	None		471		83	24	" red.
I X L	553	18	553	18	"		470	24	82	54	" flat pink and white.
Green Mountain	553	18	553	18	"		470	18	83		Long flat white.
Brownell's Winner	547	48	547	48	"		465	39	82	9	" red.
Rose No. 9	545	36	545	36	"		490	36	55		" rose.
Delaware	543	24	543	24	"		489	24	54		Round white.
Houlton Rose	542	18	542	18	"		412	58	129	26	Long flat rose.
Carman No. 1	541	12	541	12	"		487	12	54	12	Round white.

POTATOES.—TEST OF VARIETIES—*Concluded.*

Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Seattle	541	12	541	12	None...		432	57	108	15	Long round white.
General Gordon	537	54	537	54	" .		403	26	134	28	" red.
Sharpe's Seedling	533	30	533	30	" ..		400	5	133	25	" round rose.
Brown's Rot Proof	533	30	533	30	" ..		426	48	106	42	" red.
Early Harvest	528		528	..	" ..		448	48	79	12	" white.
Cambridge Russet	525	48	525	48	" ..		420	48	105	..	" round russet.
American Wonder	523	36	523	36	" ..		418	48	104	48	" flat white.
New Queen	521	24	521	24	" ..		365		156	24	" round red.
State of Maine	519	12	519	12	" ..		415		104	12	" pink.
Beauty of Hebron	514	48	514	48	" ..		409		105	48	" white.
Lizzie's Pride	510	24	510	24	" ..		357	24	153	..	" red.
Country Gentleman	509	18	509	18	" ..		433	18	76	..	" pink and white.
Enormous	506		506	..	" ..		404	50	101	10	" white.
Wonder of the World	501	36	501	36	" ..		296	36	205	..	" rose.
Early Michigan	500	30	500	30	" ..		300	30	200	..	" white.
Rawdon Rose	484		484	..	" ..		445	36	48	24	" rose.
Maule's Thoroughbred	479	46	455	46	24 .		410	12	45	34	" "
Chicago Market	479	46	479	46	None...		430	46	49	..	" red.
Everett	475	12	475	12	" ..		403	56	71	16	" round red.
Early Norther	475	12	475	12	" ..		402	50	72	22	" pink and white.
Early Andes	475	12	451	27	23	45	316		135	26	Round rose.
Canadian Beauty	470	48	470	48	None...		423		47	48	Long flat rose.
Early St. George	448	58	426	32	22	26	384		42	32	" white.
Rural Blush	444	24	444	24	None. .		356	12	88	12	Round rose.
Maggie Murphy	440		440	..	" ..		358		66	..	Long rose.
Early Rose	437	48	437	48	" ..		307	48	130	..	" "
Thorburn	435	36	435	36	" ..		261	42	173	54	Oblong pink.
Bill Nye	431		431	..	" ..		301	20	129	40	" white.
Early White Prize	429	54	429	54	" ..		301	54	128	..	" "
Pride of the Market	430	39	430	39	" ..		376	15	64	24	Long flat white.
Up to Date	426	48	426	48	" ..		277	18	149	30	Oval white.
White Beauty	413	36	413	36	" ..		350	54	62	42	Long flat white.
Sutton's Invincible	400	34	400	34	" ..		342		58	24	" white.
Pearce's Prize Winner	400	34	400	34	" ..		260		140	34	" pink and white.
Burpee's Extra Early	398	12	398	12	" ..		238	56	159	16	" rose.
Earliest of All	396		396	..	" ..		277	12	118	48	Round white.
Early Sunrise	391	36	391	36	" ..		270	12	120	24	Long rose.
Prolific Rose	385	32	385	32	" ..		270		115	32	" "
Great Divide	371	48	371	48	" ..		223	6	148	42	Round white.
Sutton's Supreme	371	15	371	15	" ..		318	48	52	27	Long white.
Ohio Junior	365	12	365	12	" ..		219	12	146	..	" pink.
Clarke's No. 1	364	6	364	6	" ..		218	51	145	15	" "
Penn Manor	352		352	..	" ..		281	36	70	24	" red.
Rural No. 2	352		352	..	" ..		301		51	..	Oblong white.
Pearce's Extra Early	347	36	347	36	" .		243	20	104	16	" rose.
Early Six Weeks	343	12	343	12	" ..		274	42	68	30	" pale rose.
Early Ohio	338	48	338	48	" ..		220	18	118	30	" dark rose.
Early Market	316	48	316	48	" ..		190	0	126	48	Oval rose.
Irish Cobbler	314	36	314	36	" ..		236		78	36	Round white.
Sir Walter Raleigh	312	24	312	24	" ..		218	40	93	44	Flat "

FODDER PLANTS.

The following fodder plants were tested this year. The ground was so cold and wet early in the season that there was a very poor stand in nearly every one of the millets, also in soja and horse beans and the subsequent growth has been poor. As in previous years the Japanese millet is the heaviest yielder, the foliage being very abundant and

the heads long and well filled while the stalks are not very coarse. All the plots of millet seeds were sown May 27.

Plot 1—Italian Millet :—

Length of stalk, 28 to 32 inches ; length of head, 4 to 5 inches ; yield when cut green, per acre, 3 tons 240 pounds.

Plot 2—Cat Tail Millet :—

Length of stalk, 30 to 32 inches ; length of head, 3½ to 4 inches ; yield per acre when cut green, 2 tons 1,680 pounds.

Plot 3—Early Algerian or Early Pearl Millet :—

Length of stalk, 30 to 32 inches ; length of head, 3 to 4 inches; yield per acre when cut green, 2 tons 1,280 pounds.

Plot 4—Moha Hungarian Millet :—

Length of stalk, 30 to 34 inches; length of head, 3 to 4 inches; yield per acre, cut green, 3 tons 720 pounds.

Plot 5—White Round Extra French Millet :—

Length of stalk, 20 to 24 inches; length of head, 2 to 3 inches; yield per acre when cut green, 2 tons 1,520 pounds.

Plot 6.—German or Golden Millet :—

Length of stalk, 24 to 26 inches; length of head, 3 to 4 inches; yield per acre when cut green, 3 tons 1,200 pounds.

Plot 7—Japanese Millet :—

Length of stalk, 40 to 44 inches; length of head, 4 to 6 inches; yield per acre when cut green, 4 tons 480 pounds.

Plot 8—Soja Beans, sown April 30 :—

Drills, 21 inches apart; length of stalk, 24 to 26 inches; very few pods formed; yield per acre when cut green, October 30, 2 tons 1,340 pounds.

Plot 9—Soja Beans, sown April 30 :—

Drills, 28 inches apart; length of stalk, 24 to 26 inches; not so many pods formed; yield per acre when cut green, 2 tons 1,920 pounds.

Plot 10—Soja Beans, sown April 30 :—

Drills, 35 inches apart; length of stalk, 24 to 26 inches; a few pods filled, but none ripened seed; yield per acre when cut green, 2 tons 640 pounds.

Plot 11—Horse Beans, sown April 30 :—

Drills 21 inches apart; length of stalk, 28 to 30 inches; very few pods formed and these were very short; yield per acre when cut green, 1 ton 440 pounds.

Plot 12—Horse Beans, sown April 30 :—

Drills 28 inches apart; length of stalk, 28 to 30 inches; very few pods and these not well filled; yield per acre when cut green, 1 ton 360 pounds.

Plot 13—Horse Beans, sown April 30 :—

Drills, 35 inches apart; length of stalk, 28 to 30 inches; a few short immature pods formed; yield per acre when cut green, 1 ton 640 pounds.

DWARF ESSEX RAPE.

Two plots were sown, one in drills, which was cultivated, the other was sown broadcast. Both plots were a comparative failure. The crop was cut and fed in September, and very little growth has been made up to the present time and no severe frosts have yet occurred.

SUNFLOWERS.

Two plots of sunflowers were sown May 11, one plot was sown in drills 30 inches apart and the other at 36 inches apart. The seed did not germinate well and the stand was scattered. The heads began to ripen early in September and as soon as the seed was well filled, in the earliest heads, the blue jays, robins and crows began to feed on them, and the best heads were destroyed before they were properly matured. There did not appear to be very much difference in the growth or size of the heads in either plot. The widest rows allowing more sunlight and air gave some ripened heads first, but the difference was not material and neither plot ripened at all evenly; some heads were fully ripened when others were only coming into bloom. On this account and because of the destruction of so much of the crop by the birds no accurate report can be made but as careful an estimate was made as was possible under the circumstances by counting the heads on a measured row, and weighing the seed from a number of average sized heads, and a conclusion reached that either plot would have produced about 1,200 pounds of clean seed per acre.

PASPALUM DILATATUM.

The plot of this grass from Australia which was reported on last year was winter-killed. There was nothing left this spring.

SAND VETCH.

This plant appears to be well adapted to this climate. The vines made a growth of over 5 feet, and blossomed freely, when cut the green crop weighed 8 tons 340 pounds; 1 ton 1,760 pounds cured. The horses and cattle do not care to eat it either cured or green.

MIXED GRAINS FOR FEED.

Several acres of mixed oats, pease and wheat were sown, part of it cut when the oats were in the dough and part left to ripen. The yield was good this year, curing a little over four tons of good feed per acre.

VEGETABLE GARDEN.

On account of the cold spring the vegetables and flower seeds sown in the garden made, as a rule, a poor stand and very slow growth. Those vegetables that require a rapid growth to produce the finest results, such as radish and lettuce, were rather poor.

LETTUCE.—Sown April 23.

Variety.	Fit for Use.	Remarks.
Forcing Milly	May 22	Leaves small ; poor.
White Tennisball	" 26	Crisp and good.
Wheeler's Tom Thumb	" 22	Only medium.
Red-edged Victoria	" 29	Good.
Algiers	June 8	Crisp.
All the Year Round (black seed)	" 10	Crisp and sweet.
All the Year Round (white seed)	" 10	"
White Marvel of Cazard	" 16	White ; crisp and tender.
Blond Stonehead	" 16	Large ; medium.
Brown Stonehead	" 16	" crisp and sweet.
Early Ohio or Nonpareil	" 8	Medium.
Neapolitan	" 19	Crisp and good.
Marvel or Red Besson	" 20	Crisp, sweet, good.
Trocadero Red-edged or Big Boston	" 20	Very good.
Hammersmith	" 20	Only medium.
Hardy Red Winter	" 14	Leathery.
Green Paris Cos	" 18	Very fine.
White Paris Cos	" 18	Crisp and good.
Balloon	" 20	"
Trianon	" 20	"

CARROTS.—Sown April 17.

Parisian Forcing	July	11	Very fine quality.
French Horn	"	22	Very sweet ; good.
Luc Half Long	"	28	Fine crisp ; sweet.
Long Blood Red	Aug.	20	Very good.

CAULIFLOWER.—Sown in hotbed March 29 ; transplanted June 1

Early Snowball	July	27	Heads firm ; good.
Extra Early Paris	"	24	" "
Extra Selected Earliest Dwarf Erfurt	Aug.	8	Heads small ; firm.
Half Early Paris	"	14	Heads firm ; good ; large.
Chambourcy Mammoth	"	20	Heads large ; open ; poor.
Large Algiers	Sept.	6	Heads open ; poor.
Autumn Giant	"	20	Heads solid ; good.

CABBAGE.—Sown in hotbed March 29 ; transplanted May 30 and 31.

Express	Aug.	10	Heads small ; firm ; fair quality.
Paris Market	"	16	" " good.
Flat Parisian	"	22	" soft and small.
Very Early Etampes	"	18	" small ; soft ; poor.
Early Jersey Wakefield	"	18	" medium ; firm ; solid.
Extra Early Mid-summer Savoy	"	24	" very solid ; good.
Early Winningstadt	"	30	" large ; solid ; very good.
Drumhead St. John's Day	Sept.	14	" " very regular heads.
Fottler's Improved Brunswick	"	14	" " " "
Red Large Drumhead	"	20	Large and very solid heads.
Red Polish Shortstem	"	20	Medium size "
Green Globe Savoy	"	20	" " "

BRUSSELS SPROUTS.—Sown in hotbed March 29 ; transplanted May 30.

Half Dwarf Paris Market	Oct.	10	Did not grow well.
Dwarf Improved	"	20	Very poor.

BROCOLI.—Sown in hotbed March 29 ; transplanted May 30.

Variety.	Fit for Use.	Remarks.
Extra Early White	Oct. 6	Heads small ; open.
Large White Mammoth	" 20	" medium.

BEETS.—Sown April 17 ; fit for table July 6.

Egyptian	July 6	A quick grower ; fine flavour.
Nutting's Dwarf Improved	" 9	" " " good colour.
Early Blood Red Turnip	" 16	" " " "
Long Smooth Blood Red	Aug. 8	Smooth ; slender ; dark red ; good.
Dell's Black Leaf	" 12	" " " very fair.

TABLE TURNIPS.—Sown April 17. A fine even stand in all these turnips.

Extra Early White Milan	June 13	Crisp ; sweet ; pleasant ; good size.
Early White Strap Leaved	" 17	" " " " flavour.
Half Long Early White Vertus	" 17	Medium grower ; poor quality.
Early Stone	" 24	Crisp ; solid ; fine quality
Yellow Robertson's Golden Ball	" 24	" rich ; fine quality and flavour.

RADISHES.—Sown April 16. Fit for table June 1.

Forcing Turnip Scarlet	June 1	Crisp ; sweet.
Forcing Scarlet White Tipped	" 1	" good.
Forcing Deep Scarlet	" 1	Crisp ; good ; sweet.
Forcing Deep Scarlet Shortleaf	" 1	Medium crisp.
Forcing White	" 6	Crisp ; juicy.
Early Scarlet Turnip	" 8	" " pleasant.
Early Scarlet White Tipped Turnip	" 8	" " very good.
Deep Scarlet Turnip	" 14	" good.
Very Early Yellow Turnip	" 6	Not crisp ; a little tough.
Olive Shaped Scarlet	" 14	Tough and stringy.
Olive Shaped Scarlet White Tipped	" 20	Medium crisp ; pleasant.

WINTER RADISH.—Sown June 16 ; pulled November 10.

Winter Russian, large, crisp, fine flavour.
Winter Black Long Spanish, large, sweet, crisp, good.
Winter Scarlet China, medium large, crisp, sweet.

BEANS.—Planted April 17.

Variety.	Fit for Table.	Remarks.
King of the Wax Beans	July 11	Vines small, not productive ; pods 2 to 3 inches long crisp, good flavour ; ripe Sept. 4.
Fame of Vitry	" 22	A moderate grower, productive ; pods 4 to 6 inches long, crisp, good ; ripe Sept. 8.
Dwarf, Emperor of Russia	" 26	A medium grower, productive ; pods 3 to 5 inches long, crisp, fine flavoured ; ripe Sept. 11.
Dwarf, Golden	" 26	A strong grower and productive ; pods 3 to 4½ inches long, crisp, fine quality ; ripe Sept. 8.
French Dwarf, Extra Early	" 24	Vines short, not productive ; pods 3 to 4 inches long, good flavour ; ripe Sept. 11.
Flageolet, Black Speckled	" 24	A medium grower and productive ; pods 3½ to 5 inches long, crisp, pleasant flavour ; ripe Sept. 24.
Canadian Wonder	" 21	Vigorous grower and productive ; pods 4 to 6 inches long, plump, crisp, good flavour ; ripe Oct. 4.

TABLE CORN.—Planted May 22.

Variety.	Fit for Table.	Remarks.
Early White Cory	Sept. 15	Ears 6 inches long, well filled ; good quality.
Early Crosby Sugar	October 22	Ears short, not well filled ; good quality.
Stowell's Evergreen	" 30	Good ears, well filled but very late.
Perry's Hybrid	" 30	Ears short and only in early milk when cut.
New Champion Sugar	" 23	Ears short and poor ; a poor variety.
Nonsuch Sugar		Early milk when cut, Nov. 3.
Country Gentleman		" " "
Pop Corn		Stalks 5 feet high and 2 to 3 ears of 6 inches long on each stalk.

CELERY.—Sown in hotbed, March 29 ; transplanted to garden June 4.

Variety.	Fit for Use.	Remarks.
Rose Ribbed Paris	Sept. 4	Poor flavour.
Paris Golden Yellow	October 1	Good quality.
Giant Pascal	" 13	Coarse and stringy.
Red Large Ribbed	" 10	Coarse and poor.

GARDEN PEASE.—Sown May 18.

Variety.	Fit for Table.	Size of Pea.	Length of Pod.	Remarks.
			Ins.	
American Wonder	June 16	Medium	2¼	Vines well loaded ; good quality.
Alaska	" 21	Small	2	" " "
Nott's Excelsior	" 21	"	2½	" " "
McLean's Advance	July 2	Medium	2½	Not well loaded ; fair quality.
Pride of the Market	" 6	Large	3½	Vines well podded ; good flavour.
Admiral	" 14	Small	3½	A medium crop ; fair quality.
Duke of Albany	" 10	Large	3½	Well loaded ; extra fine quality.
Shropshire Hero	" 12	Medium	4	" good quality.
Telephone	" 10	Large	4	Medium crop ; "
Stratagem	" 12	"	3½	" "
New Dwarf, Telephone	" 15	"	4	Well podded ; "
Heroine	" 16	"	4	" "
Champion of England	" 20	"	3	Medium crop ; "
Gradus	" 21	"	3	" "

ONIONS.—Sown April 13.

Variety.	Remarks.
James Keeping	Very few of the seeds germinated ; no crop.
White Dutch	" " " a few small onions.
Weatherstield Large Red	The only one that made bottoms ; 110 bush. per acre.
Blood Red	A few bottoms, but most of the poor crop was necks.
Market Favourite Keeping	Very few bottoms ; a few small soft onions.
Danvers Yellow Globe	Seed grew well, but the crop failed to bottom.
Trebon's Large Yellow	Seed failed to grow : no crop.
Straw Coloured White Spanish	Seed grew well, but roots very small ; no bottoms.
Paris Silverskin	Very few onions, but a good sample of the sort.

SQUASH.—Planted May 1.

Variety.	Fit for Use.	Remarks.
Summer Crookneck	August 15	Vines not productive; squash small and watery.
Early White Scallop	" 13	Not productive; quality good; flavour good.
The Warren	" 10	Vines vigorous and moderately productive; largest squash 11 lbs.; flesh thick, rich, yellow, dry and good.
Extra Early Orange	" 16	Vines vigorous and productive; flesh thick, rich, yellow and very fine flavour; largest squash 9½ lbs.
Hubbard	Sept. 1	Vines vigorous and medium productive; flesh thick, rich, dry and good; heaviest squash 11¾ lbs.
Faxon	" 6	Vines vigorous but not productive; not high quality; largest squash 15½ lbs.
Mammoth Chili	October —	Vines very vigorous and productive; too coarse for table use; largest squash 43 lbs.
Perfect Gem	August 20	Vines very vigorous and productive; quality good; largest squash 6 inches in diameter.

PUMPKINS.—Planted May 2.

Variety.	Remarks.
Mammoth Tom	Vines very vigorous and productive; pumpkins large, oblong, heavy.
Quaker Pie	Vines medium, vigorous and only moderately productive; fruit medium or below in size, round, flattened, good quality.
Winter Luxury	Vines very vigorous and productive; fruit small, orange yellow round, of good quality; fit for use August 10.
Golden Marrow	Vines vigorous and productive; fruit large, golden orange, flesh deep, fine quality; ripe August 20.
Large Cheese	Vines medium growers, vigorous, not productive; fruit large, very thick fleshed, fair quality; fit for use August 30.
Calhoun	Vines medium in vigour and productiveness; flesh very thick, but cracks late in the season; ripe September 20.

DISTRIBUTION OF SEED SAMPLES.

This branch of the work is increasing rapidly and the interest shown in it is good evidence that those who take care to save the produce of the samples received are in many instances benefited.

In a province of such area and great diversity of climate as British Columbia many samples are not a success, but many are, and where one sample proves successful the grower is soon able to supply neighbours with seed.

One farmer reports 740 lbs. of potatoes from a three lb. sample of American Wonder, and from 130 lbs. to 200 lbs. was quite a common return from a 3-lb. sample this year.

Packages of scions	241
Packages of nuts	97
Packages of small fruit	131
3 lb. samples potatoes	259
3 lb. samples pease	87
3 lb. samples oats	246
3 lb. samples barley	184
3 lb. samples wheat	168

The correspondence of the farm is increasing, the number of letters received this year was 2,518, and the answers sent out 2,378

APPLES.

Wet weather was almost continuous with cold north winds and occasional light frosts during the blossoming period, and this was no doubt the cause of a comparative failure in all the tree fruits this year.

Fruit trees of all sorts bloomed very profusely and having made a vigorous growth last year should if the weather had been favourable, have given a heavy crop of all sorts.

In the following notes will be found short descriptions of those varieties which fruited this year for the first time :

Lord Suffield.—Tree a very vigorous grower and an early bearer. Fruit medium to large, smoothly conical. Skin light yellow, with a pale blush, flesh whitish, soft, rather coarse, mildly acid. Season August.

Early Rivers.—Tree a medium grower and an early producer. Fruit large, oblong and tapering to the eye. Skin yellowish white. Flesh white, soft, rather coarse; sprightly acid, juicy. Season August.

Domino.—Tree a medium grower and an early bearer. Fruit above medium size, globular tapering slightly to the eye. Skin yellowish white, with a pink blush. Season August.

Red Summer Peach.—Tree a strong grower. Fruit of medium size round, tapering to the eye ; skin golden yellow, nearly covered with bright red. Flesh soft, crisp, white, mildly acid, with a pleasant flavour. Season August.

Beautiful Arkad.—Tree a strong and healthy grower. Fruit of medium size, oblong, conical ; skin clear golden yellow, with a pale reddish blush. Flesh white, crisp, juicy, with a pleasant flavour, mildly acid. Season August.

Lubsk Queen.—Tree a strong grower. Fruit large, oblong, conical ; skin yellowish, nearly covered with splashes of bright red and a thin whitish bloom. Flesh white, crisp, juicy, mildly sub-acid, or nearly sweet. Season August.

Madam Niemetz.—Tree a vigorous grower. Fruit of medium size, round, flat; skin green, streaked with dull red. Flesh greenish white, firm, juicy, mildly sub-acid, with a pleasant flavour. Season August.

Taarenborg.—Tree a vigorous open spreading grower. Fruit of medium size ; skin greenish yellow, with a pale blush on sunny side. Flesh white, a little coarse, juicy, crisp, mildly acid, with a pleasant flavour. Season August.

Red Pigeon.—Tree a vigorous grower and an early bearer. Fruit of medium size, conical ; skin yellow, striped and splashed with two shades of red. Flesh white, crisp, moderately juicy, mildly acid, with a pleasant flavor. Season August.

Orange.—Tree a medium grower. Fruit of medium size, flattish, tapering a little to the eye; skin greenish yellow, with a faint, dull red blush. Flesh white, soft, juicy, sub-acid. Season August.

Red Summer Calville.—Tree a medium grower. Fruit small, conical, inclined to scab ; skin greenish yellow with stripes of dull red, flesh greenish white, soft, juicy, with a pleasant flavour; sub-acid. Season August.

Drap d'Or.—Tree a moderate grower. Fruit above medium size, roundish, oblate ; skin dull greenish yellow with numerous small brown dots. Flesh yellowish, crisp, moderately juicy and mildly acid. Season August.

Gold Prince.—Tree a vigorous grower. Fruit large, oblong, tapering slightly to eye ; skin whitish golden, striped with bright clear red. Flesh yellowish, tender, mildly sub-acid ; not juicy. Season August.

Transparent de Croncelles.—Tree a strong grower and early bearer. Fruit large globular ; skin yellowish white, with a pink flush on sunny side. Flesh coarse, yellowish, moderately juicy and mildly acid. Season August.

Cove.—Tree a moderate grower. Fruit of medium size, oblate ; skin green, nearly covered with dull red, and small patches of russet. Flesh white, tender, with a pleasant flavour, mildly acid. Season August.

Striped July.—Tree a slow grower. Fruit of medium size, conical ; skin yellow, freely splashed and striped with red. Flesh white, juicy, tender, with a pleasant flavour sub-acid. Season August.

Early Joe.—Tree a slow grower. Fruit small, oblate, tapering a little to eye ; skin greenish yellow, splashed with red. Flesh white, crisp, fine grained, of a pleasant flavour, mildly acid. Season August.

Sylvan Sweet.—Tree a medium grower and an early bearer. Fruit small, roundish, oblate ; skin yellow nearly covered with bright red ; flesh yellowish, crisp, not juicy, but sweet, with a pleasant flavour. Season August.

White Transparent.—Tree a vigorous grower. Fruit of medium size, roundish, conical; skin dull yellow, with stripes and splashes of pale red. Flesh white, soft moderately juicy ; mildly sub-acid, with a pleasant flavour. Season August.

Moscow.—Tree a slow grower. Fruit of medium size, roundish ; skin greenish yellow, with a dull red cheek. Flesh white, juicy, soft, mildly sub-acid, with a pleasant flavour. Season August.

Raspberry.—Tree a moderate grower. Fruit of medium size, conical ; skin golden yellow, striped and splashed with bright red. Flesh white, crisp, tender, juicy, mildly sub-acid, with a pleasant flavour. Season August.

Late Duchess.—Tree a medium grower. Fruit small, oblong, conical ; skin yellowish white, lightly striped with red. Flesh yellowish, moderately juicy, soft, tender, sweet. Season August.

Early Ripe.—Tree a vigorous grower. Fruit of medium size, roundish, conical, skin greenish yellow, with a pale reddish blush. Flesh white, crisp, moderately juicy, mildly acid, with a pleasant flavour. Season August.

Colton.—Tree a vigorous grower and an early bearer. Fruit of medium size, oblong, conical ; skin yellow with a purple flush nearly over the whole surface. Flesh white, firm, juicy, sub-acid, with a good flavour. Season early October.

Hibernal.—Tree a vigorous and healthy grower. Fruit large, conical ; skin greenish with a red cheek. Flesh white, crisp, juicy, a little coarse, mildly acid. Season September.

Early Golden Margaret.—Tree a medium grower. Fruit of medium size, oblong, conical ; skin yellowish white. Flesh yellowish, firm, crisp, juicy, with a pleasant flavour and mildly acid. Season September.

Marseilles Summer.—Tree a medium grower. Fruit of medium size, conical ; skin yellow, with a reddish blush on the sunny side. Flesh white, moderately juicy, crisp, mildly acid, with a pleasant flavour. Season September.

Cousinot Purple Red.—Tree a free grower. Fruit small to medium, oblong conical ; skin green with streaks and splashes of dull red. Flesh white, crisp, firm, moderately acid. Season October.

Autumn Short Stem.—Tree a poor grower. Fruit small, round, flattened ; skin greenish with many whitish dots and a faint reddish blush on the sunny side. Flesh greenish white, juicy, crisp, mildly acid, with a pleasant flavour. Season September.

Langtons.—Tree a strong grower and an early bearer. Fruit of medium size, globular, slightly flattened at stem and calyx ; skin yellowish green, splashed with two shades of red and many white dots, and with a little russet about the stem. Flesh white, firm, juicy, fine grained, mildly acid with a pleasant flavour. Season early September.

Peasgoods Golden Reinette.—Tree a vigorous grower and an early bearer. Fruit of medium size, conical ; skin smooth golden yellow, with a red cheek. Flesh yellowish, juicy, crisp, mildly acid, with a pleasant flavour. Season October.

Bostic Queen.—Tree a medium grower. Fruit of medium size, oblate, conical, skin green with a dull red cheek and many grey dots. Flesh yellowish, firm, juicy, mildly sub-acid with a pleasant flavour. Season October.

Barloff.—Tree a strong grower. Fruit small, conical ; skin green with a dull red cheek. Flesh white, moderately juicy, mildly acid, with a pleasant flavour. Season October.

Orleans Reinette.—Tree a medium grower and an early bearer. Fruit small to medium, conical; skin greenish yellow, with a little russet about the stem, and a reddish blush on the cheek. Flesh white, firm, crisp, juicy, sprightly acid. Season October.

Harvest Reinette.—Tree a medium grower. Fruit of medium size, oblong, tapering a little to the eye : skin greenish russet, with a little bronzy blush. Flesh white, firm, juicy, mildly acid, with a pleasant flavour. Season October.

Staar.—Tree a strong grower. Fruit of medium size, oblate ; skin greenish yellow, with many grey dots. Flesh white, crisp, juicy, sprightly, with a pleasant flavour. Season October.

Gideon's No. 30.—Tree a vigorous grower. Fruit above medium size, oblate, handsome ; skin greenish yellow, striped and splashed with bright red. Flesh white, crisp, juicy, mildly acid, is liable to rot at the core. Season October.

Painted Lady.—Tree a medium grower. Fruit above medium size, conical ; skin, greenish white with a dull red cheek, sprinkled with white dots, and covered with a thin whitish bloom. Flesh yellowish white, firm, moderately juicy, coarse grained, mildly acid with a pleasant flavour. Season October.

Golden Noble.—Tree a medium grower. Fruit above medium size, oblate ; skin greenish yellow, sprinkled with many whitish dots. Flesh white, juicy, firm, mildly sub-acid, with a pleasant flavour. Season October.

Landsburg Reinette.—Tree a strong grower. Fruit medium size, irregular, conical, rather knotty; skin green with patches of russet about the stem. Flesh white, moderately juicy, firm, sub-acid, inclined to water core and spoil before fully ripe. Season October.

Dr. Seeliy's Orange.—Tree a strong grower. Fruit of medium size, globular tapering a little to the eye; skin greenish yellow. Flesh white, firm, juicy, sprightly not high flavoured, is liable to water core. Season October.

Enormous.—Tree a strong and spreading grower. Fruit medium to large, obtuse, conical, irregular in size and shape ; skin dull yellow, with a little russet about the stem. Flesh yellowish white, coarse granular, moderately juicy, sub-acid. Season October.

Thompson's Seedling, No. 66.—Tree a strong, spreading grower. Fruit of medium size, oblate, slightly conical ; skin green, nearly covered with orange and splashed with bright red. Flesh yellowish white, firm, crisp, fine grained, with a pleasant flavour. Season October.

Thompson's Seedling, No. 46.—Tree a strong grower. Fruit medium to above medium size, oblate ; skin greenish yellow, shaded with dull red and having a sprinkling of gray dots. Flesh white, fine grained, juicy, sprightly, with a fine and pleasant flavour. Season October.

Thompson's Seedling, No. 24.—Tree a vigorous grower. Fruit of medium size, conical. Skin yellowish green, with a red blush. Flesh white, juicy, crisp, sub-acid, with a pleasant flavour. Season October.

Colfax.—Tree a strong grower and an early bearer. Fruit above medium size, oblong, globular; skin yellowish green, nearly covered with deep red. Flesh crisp, juicy, sub-acid, with a pleasant flavour. Season October.

Filippa.—Tree a medium grower. Fruit of medium size, oblong; skin yellow, with an orange reddish cheek, and many russet dots. Flesh white, tender, fine grained, mildly acid, with a fine pleasant flavour. Season October.

Henzen's Pearmain.—Tree a strong grower. Fruit of medium size, roundish globular ; skin green, nearly covered with dull red. Flesh white, crisp, mildly acid, moderately juicy, with a pleasant flavour. Season October.

The Queen.—Tree a moderate grower and an early bearer. Fruit large, oblate ; skin greenish yellow, splashed and streaked with bright red. Flesh white, firm, juicy, crisp, with a good flavour ; mildly acid. Season October.

Cellini.—Tree a fair grower and free producer. Fruit of medium size, oblong, slightly conical ; skin greenish yellow, nearly overspread with deep red. Flesh white, crisp, juicy, often stained with red, mildly acid, with a pleasant flavour. Season October and November.

Arnold's Beauty.—Tree a strong and upright grower. Fruit of medium size, oblate, tapering slightly to eye; skin clear yellow, with a bright red cheek. Flesh yellowish, fine grained, juicy, mildly sub-acid, with a pleasant aromatic flavour. Season October and November.

Pioneer.—Tree a moderate grower. Fruit of medium size, round, flattened at the ends; skin yellow, with a light red cheek. Flesh yellowish, tender, juicy, sub-acid, with a pleasant flavour. Season October and November.

Orange Pippin.—Tree a vigorous grower. Fruit of medium size, oblate ; skin greenish yellow, with a few white dots. Flesh yellowish white, juicy, tender, fine grained, mildly acid, with a pleasant flavour. Season October and November.

Golden Ball.—Tree a strong grower. Fruit of medium size, conical, skin yellow with patches of russet about the stem. Flesh yellow, firm, fine grained, juicy, sub-acid, with a pleasant flavour. Season November.

Early Almond.—Tree a strong grower and an early bearer. Fruit of medium size, round. Skin yellow striped and splashed over nearly the whole surface with light and dark red. Flesh white, firm, juicy, fine grained, mildly acid with a pleasant flavour. Season November.

Sansspareil.—Tree a vigorous grower and an early bearer. Fruit of medium or below medium size, oblong, ribbed. Skin yellowish-green with a reddish tint, and a few small streaks of red on the sunny side, Flesh white, firm, juicy, mildly sub-acid. Season October and November.

Claudius.—Tree a vigorous grower. Fruit small, round, flattened. Skin greenish-yellow. Flesh whitish, firm, juicy, sub-acid with a pleasant flavour. Season November and December.

Green Reinette.—Tree a medium grower and an early bearer. Fruit small, conical. Skin nearly covered with a dull reddish russet. Flesh greenish-white, firm, juicy sub-acid. Season November and December.

Red Reinette.—Tree a free grower. Fruit above medium size, oblong, conical, skin greenish-yellow, with a purple red cheek on the sunny side, and sprinkled with white dots, a handsome fruit. Flesh yellowish, juicy, firm, fine grained, mildly acid with a pleasant flavour. Season November and December.

Cossenza.—Tree a strong grower and an early bearer. Fruit small globular ; skin greenish-yellow, with patches of russet. Flesh yellowish, firm, moderately juicy, sweet, with a pleasant flavour. Season November and December.

Marie.—Tree a medium grower. Fruit of medium size, roundish oblong ; skin green, splashed on the sunny side with streaks of bright red. Flesh white, firm, juicy, sub-acid. Season December.

Ildrod Pigeon.—Tree a medium grower. Fruit small, conical; skin green, with a dull red cheek and a few gray dots. Flesh white, juicy, fine-grained, mildly acid, with a fine pleasant flavour. Season November and December.

Cranberry Seedling.—Tree a strong and upright grower, but slow in coming into bearing. Fruit small, roundish, conical ; skin yellow, with sometimes a faint blush and a few whitish dots. Flesh white, firm, medium juicy, sweet, with a pleasant aromatic flavour. Season November and December.

Muscat Reinette.—Tree a vigorous grower and an early bearer. Fruit of medium size, oblate, tapering slightly to the eye ; skin yellow, covered with a reddish-russet, and splashed with deep red. Flesh yellowish, firm, juicy, mildly acid, with a fine pleasant flavour. Season December.

Ewalt.—Tree a strong grower and an early bearer. Fruit large, roundish, conic; skin bright yellow with a blush on the sunny side. Flesh white, tender, juicy, sprightly, with a good flavour. Season December.

McKinley.—Tree a vigorous grower and an early producer. Fruit below medium size, roundish flattened, skin greenish-yellow, nearly covered with dull red. Flesh white crisp, fine grained, juicy, mildly acid, with a pleasant flavour. Season December.

Forest.—Tree a slow grower and a poor bearer. Fruit of medium size, oblong conical, ribbed, skin yellow nearly covered with dull red and sprinkled with gray dots. Flesh yellow, crisp, nearly sweet, juicy with a pleasant, somewhat aromatic flavour. Season December.

Barton's Favourite.—Tree a vigorous grower and an early producer. Fruit small, conical, skin green, nearly covered with dull red and sprinkled with white dots. Flesh white, firm, juicy, sub-acid. Liable to be scabby. Season December.

Red Eiser.—Tree a strong grower. Fruit of medium size, conical, skin green with a deep red blush on the sunny side, and many white dots. Flesh greenish white, firm, fine grained, spicy, good. Season December.

Dutch Golden Pippin.—Tree a moderate grower. Fruit below medium size, globular, skin dull greenish-yellow. Flesh yellowish white, firm, fine grained, juicy with a pleasant flavour. Season December and January.

Little Red Winter.—Tree a slow and slender grower. Fruit below medium size, oblate conical, skin greenish-yellow striped and splashed with red. Flesh firm, white, juicy, mildly acid with a pleasant flavour. Season December.

Zuzoff Winter.—Tree a medium grower. Fruit of medium size, oblong, tapering a little to the eye; skin green, nearly covered with dull purple red, and scabby. Flesh white, juicy, firm, sprightly. Season December.

Virginia Queen.—Tree a slow grower. Fruit small, conical; skin green, nearly covered with bright purple red. Flesh greenish, firm, moderately juicy, mildly acid. Season December.

Rudolph's Borsdorfer.—Tree a medium grower. Fruit small, round, flattened; skin greenish-yellow, with a faint blush. Flesh white, juicy, crisp, sub-acid, with a pleasant flavour. Season December.

Shirk.—Tree a strong grower. Fruit of medium size, conical; skin green, with a small red cheek on the sunny side. Flesh white, juicy, fine grained, mildly acid, with a pleasant flavour. Season December.

Windsor Chief.—Tree a medium grower. Fruit large, globular, ribbed, and slightly conical; skin green, nearly covered with dull red and sprinkled with whitish dots. Flesh greenish-white, firm and juicy, with a pleasant flavour; nearly sweet. Season December.

Bloomless.—Tree a medium grower. Fruit below medium in size, globular; skin greenish-white, with a few small patches of dull red and a whitish bloom. Flesh firm, white, juicy, fine grained, sweet with a pleasant flavour. Season December.

Golden Winter Pearmain.—Tree a vigorous grower and an early bearer. Fruit of medium size, conical; skin orange-russet, with a little red on the sunny side. Flesh juicy, yellowish-white, firm, sub-acid and of fine flavour. Season December.

New English Pigeon.—Tree a strong grower. Fruit below medium size, conical; skin green, nearly overspread with dull red. Flesh white, juicy and sprightly. Season December.

Seaton House.—Tree a vigorous grower, and an early bearer. Fruit of medium size, oblate, tapering to the eye; skin clear golden yellow, with streaks of light and dark red. Flesh yellowish, firm, moderately juicy, sub-acid, with a pleasant flavour. Season December and January.

Golden Queen.—Tree a strong grower and an early bearer. Fruit of medium size, oblong, conical irregularly ribbed; skin yellow with an orange red cheek, and a few greenish dots. Flesh whitish, firm, juicy, mildly acid, with a pleasant flavour. Season December.

Gill's Beauty.—Tree a moderate grower. Fruit large, globular, tapering a little to the eye; skin green, striped and splashed with red. Flesh white, firm, moderately juicy, mildly acid, with a pleasant flavour. Season December.

Pickard's Reserve.—Tree a medium grower. Fruit of medium size, oblate; skin a russet yellow, with a small red blush on sunny side, and a few gray dots. Flesh juicy, yellowish, firm, sub-acid, with a pleasant aromatic flavour. Season December.

Harrison.—Tree a strong grower and an early bearer. Fruit of medium size, globular, tapering a little to the eye; skin greenish-yellow, with a small red blush in the sun. Flesh white, moderately juicy, firm, mildly acid. Season winter.

Oberdick's Pearmain.—Tree a medium grower. Fruit of medium size, oblong, globular, tapering a little to the eye; skin green with a dull red cheek and a few splashes of brighter red. Flesh white, firm, juicy, sub-acid, with a fine spicy flavour. Season winter.

Deak's Winter Calville.—Tree a strong grower. Fruit large, conical, deeply ribbed; skin greenish-yellow with a few whitish dots. Flesh white, firm, juicy, mildly acid, pleasant flavour. Season winter.

Steednicne.—Tree a vigorous grower. Fruit small, conical; skin greenish-yellow. Flesh white, firm, juicy, sub-acid, with a pleasant flavour. Season winter.

Flintinge.—Tree a strong grower. Fruit of medium size, oblong, conical; skin yellow, with a red cheek and small stripes of light red. Flesh yellowish, juicy, firm, fine-grained, with a pleasant flavour. Season winter.

Boiken.—Tree a strong grower. Fruit of medium size, irregularly ribbed, conical; skin greenish with a red cheek and many white dots. Flesh white, firm, juicy, mildly acid with a pleasant flavour. Season winter.

Red Winter Sweet.—Tree a medium grower. Fruit of medium size, round conical; skin greenish-yellow, with streaks and patches of bright red. Flesh yellowish, a little coarse, moderately juicy, very sweet. Season winter.

Martha Washington.—Tree a strong grower. Fruit of medium size, oblong, globular; skin yellowish green, with a few patches of dull red. Flesh greenish-white, juicy, mildly acid, with a pleasant flavour. Season winter.

Allen's Russet.—Tree a strong grower. Fruit small, conical; skin grayish-russet, with a blush on the sunny side. Flesh white, crisp, juicy, mildly acid, with a pleasant flavour. Season winter.

Springdale.—Tree a strong grower. Fruit small, globular; skin green, nearly overspread with dull purple, and sprinkled with gray dots. Flesh greenish white, firm, juicy, mildly acid, inclined to scab. Season winter.

Bright Water.—Tree a strong grower. Fruit of medium size, conical; skin green, with large patches of russet and a red blush on the sunny side. Flesh white, firm, moderately juicy, nearly sweet. Season winter.

Aiken.—Tree a vigorous grower. Fruit of medium size, globular; skin green, with a red cheek and stripes of red over nearly the whole surface. Flesh yellowish-white, juicy, rather acid. Season winter.

Yates Winter.—Tree a vigorous grower. Fruit small, conical ; skin green with a few stripes of red and many white dots, and a thin whitish bloom. Flesh greenish white, firm, juicy, mildly acid, with a pleasant flavour. Season winter.

Court Pendu Royal.—Tree a vigorous grower. Fruit of medium size, flat; skin greenish-yellow, nearly covered with deep red. Flesh yellowish, crisp, moderately juicy, sprightly acid. Season winter.

Pomme Grise.—Tree a slender medium grower. Fruit small, roundish, oblate; skin greenish gray, with russet and a small blush in the sun. Flesh white, tender, moderately juicy, with a rich flavour. Season winter.

Wandering Spy.—Tree a strong and spreading grower. Fruit of medium size, oblate ; skin greenish-white with a dull red cheek in the sun. Flesh greenish-white, firm, juicy, mildly acid, with a pleasant aromatic flavor. Liable to scab. Season winter.

Winter-Green.—Tree a strong grower. Fruit above medium in size, oblate, slightly conical ; skin russet-yellow. Flesh yellowish, moderately juicy, sub-acid with a pleasant flavour. Season winter.

Danver's Winter Sweet.—Tree a slow grower. Fruit small to medium, oblong, conical ; skin smooth dull yellow with a red cheek. Flesh yellow, firm, sweet with a fine flavour. Season winter.

Lord Nelson.—Tree a medium grower. Fruit small, conical ; skin greenish-yellow with a faint blush on the sunny side. Flesh yellowish, crisp, moderately juicy, mildly acid, often deformed and scabby. Season winter.

Babbit.—Tree a strong grower. Fruit below medium size, conical ; skin greenish-yellow, with a dull red cheek on the sunny side. Flesh white, firm, moderately juicy, somewhat acid, often scabby and deformed. Season winter.

Hyfill.—Tree a strong healthy grower. Fruit small, oblate, conical ; skin greenish, with purple nearly over the whole surface, and a few white dots. Flesh greenish-white, firm, juicy, mildly acid, with a pleasant flavour. Season winter.

North Carolina Limber Twig.—Tree a medium grower. Fruit of medium size, conical ; skin green, with purple over nearly the whole surface. Flesh white, firm, juicy, nearly sweet with a pleasant flavour. Season winter.

Edeldorfer.—Tree a strong grower. Fruit small, globular, tapering slightly to the eye ; skin yellowish-white, with a reddish cheek and a few whitish dots. Flesh yellowish, firm, juicy, mildly acid, with a pleasant flavour. Season Winter.

Red Winter Tauben.—Tree a strong grower. Fruit below medium size, conical ; skin green with a red cheek and many white dots. Flesh white, firm, juicy, mildly sub-acid, with a pleasant flavour. Somewhat scabby. Season winter.

Black Annette.—Tree a vigorous grower. Fruit small, roundish, conical ; skin green, with dark red nearly over the whole surface. Flesh firm, not juicy, sub-acid. Season winter.

Maxey.—Tree only a moderate grower. Fruit of medium size, roundish, slightly conical ; skin green with a red cheek and a few stripes of dull red, and sprinkled with white dots. Flesh greenish-white, firm, mildly acid. Season winter.

Cranberry Winter.—Tree a moderate grower. Fruit small, conical ; skin yellow, with a little red on the sunny side. Flesh white, firm, moderately juicy, with a pleasant flavour. Season winter.

Parker's Pippin.—Tree a strong grower. Fruit below medium size, globular, slightly conical ; skin orange-russet, with occasionally a blush on cheek. Flesh white, juicy, mildly acid, with a pleasant flavour. Season winter.

Spanish Borsdorf.—Tree a vigorous grower. Fruit large, roundish, conical ; skin greenish white with many gray dots. Flesh white, crisp, juicy, mildly sub-acid, firm, and of good flavour.. Season winter.

Bauman's Reinette.—Tree a vigorous grower and an early bearer. Fruit small to medium, roundish oblate ; skin greenish-yellow, with a reddish blush and a few brown dots. Flesh yellowish, juicy, firm, fine-grained, nearly sweet, of good flavour. Season winter.

Red Winter Pigeon.—Tree a moderate grower. Fruit of medium size, conical ; skin greenish-yellow, with a small red cheek and many white dots. Flesh white, firm, sprightly, acid. Season winter.

Lincoln.—Tree a strong grower. Fruit medium to large, oblate, conical ; skin greenish-yellow, with a bright red blush and a few grayish dots. Flesh white, firm, moderately juicy, mildly acid, with a pleasant flavour. Season winter.

Palmer Greening.—Tree a vigorous grower and an early bearer. Fruit above medium size, roundish, oblate ; skin yellowish-green, with a clear red cheek and many grey dots. Flesh white, crisp, juicy, sub-acid, with a pleasant aromatic flavour. Season winter.

Brownlee's Russet.—Tree a vigorous grower. Fruit medium to large, roundish flattened ; skin green with a dull russet-red cheek. Flesh greenish-white, tender, juicy, aromatic, sweet. Season winter.

Nelson Sweet.—Tree a vigorous grower and early bearer. Fruit of medium size, roundish, flattened ; skin dull greenish-yellow, with a bronze-red cheek. Flesh yellowish, firm, moderately juicy, sweet. Season winter.

New Berner Rose.—Tree a strong grower. Fruit small, conical; skin greenish yellow, with splashes of dull red in the sun, and small whitish dots. Flesh greenish white, juicy, firm, sprightly, acid. Season winter.

Aushaulder.—Tree a medium grower. Fruit of medium size, conical; skin greenish yellow, nearly overspread with dull red and with many white dots. Flesh greenish white, firm, juicy, mildly acid. Season winter.

Spath's Seedling.—Tree a vigorous grower. Fruit of medium size, oblong conical; skin green, nearly overspread with a deep red and a few white dots. Flesh white, juicy, firm, mildly acid. Season winter.

Chelmsford Wonder.—Tree a vigorous grower. Fruit above medium size, oblate, globe-shaped, ribbed; skin yellow, with a pink cheek and sprinkled with carmine dots. Flesh yellowish, firm, a little coarse, moderately juicy, mildly acid. Season winter.

Himbeer.—Tree a medium grower. Fruit small, globular; skin greenish white, with a little red on the sunny side. Flesh white, crisp, moderately juicy, sweet. Season winter.

Calville Oberslebener.—Tree a strong grower. Fruit small, round, obtuse, conical; skin yellow with a bright clear, red cheek. Flesh yellowish, crisp, moderately juicy, with a pleasant flavour. Season winter.

Brakefield Seedling.—Tree a strong grower and early bearer. Fruit small, oblate, conical; skin yellow, splashed with two shades of red. Flesh white, firm, juicy crisp, with a fine aromatic flavour, nearly sweet. Season winter.

Nor-western Greening.—Tree a strong grower and early producer. Fruit of medium size, globular, tapering a little to the eye ; skin greenish-yellow. Flesh white, fine-grained, juicy, mildly acid, with a pleasant flavour. Season winter.

Kennedy Seedling.—Tree a strong grower and free producer. Fruit of medium size, irregularly globe shaped; skin greenish-yellow, nearly covered with deep red and sprinkled with a few white dots. Flesh white, often stained with red, crisp, juicy, sub-acid, with a pleasant flavour. Season winter.

Lady Finger.—Tree a vigorous grower. Fruit of medium size, oblong, conical ; skin yellow, freely splashed with red and sprinkled with brown dots. Flesh whitish, firm, not juicy, nearly sweet. Season winter.

Norcia.—Tree a moderate grower. Fruit small, conical; skin yellow, nearly covered with streaks and splashes of red in two shades. Flesh white, firm, juicy, mildly acid, with a pleasant flavour. Season winter.

Counsillor Niemetz.—Tree a vigorous grower. Fruit of medium size, round, flat; skin greenish-yellow, with red over nearly the whole surface, and a few whitish dots. Flesh yellowish-white, juicy, tender, mildly acid, with a pleasant aromatic flavour. Season winter.

PEARS.

The same cause that prevented the blossoms on the apple trees from setting, affected the pears also. Many of the young trees and all of the old ones were full of bloom, but very few had any fruit, the blossoms falling without forming fruit at all.

The Bartlett, Vicar of Winkfield and the Keiffer gave light crops, and the Beurre Clairgeau had a few specimens. These formed the larger part of the crop on the older trees. The following pears fruited for the first time :

Koolstock.—Tree a medium grower. Fruit above medium size, pyriform tapering sharply to the stem, which is one inch long; skin whitish green, with many small gray dots. Flesh white, juicy, smooth, fine-grained, gritty near the core, and a little astringent. Season last of August.

Loriol de Barney.—Tree a moderate grower. Fruit long pear shape, smooth and tapering to a point at the stem; skin greenish, nearly covered with orange and sprinkled with small gray dots. Flesh whitish, fine-grained, juicy, sweet, with a pleasant flavour. Season September.

King Sobieski.—Tree a slow grower. Fruit blunt pyriform, of medium size; skin orange with a reddish cheek and freely sprinkled with gray dots. Flesh whitish, fine-grained, juicy, sweet, with a pleasant flavour. Season, September.

Madam Verte.—Tree a slow grower. Fruit of medium size, almost globular; skin greenish orange, with a bright orange cheek. Flesh white, sweet, not very juicy, aromatic. Season September.

Diel's August.—Tree a strong grower. Fruit above medium size, obtuse pyriform; skin orange-yellow, with many brown dots and patches of russet. Flesh yellowish, coarse grained, slightly astringent. Not of fine quality. Season October.

Boisbunel.—Tree a strong grower. Fruit small, pyriform; skin greenish yellow, with a bronze red cheek and many brown dots. Flesh whitish, a little coarse, juicy, sweet, with a pleasant flavour. Season October.

Beurre Dumortier.—Tree a medium grower. Fruit of medium size, roundish, pyriform; skin yellowish-green, with patches of russet and many russet dots. Flesh greenish white, juicy, fine-grained, sweet. Season October.

Coloma.—Tree a strong grower. Fruit small, pyriform; skin greenish yellow, with large patches of russet and many russet dots. Flesh white, juicy, breaking, with a pleasant vinous flavour. Season October.

Crassane d'Automne.—Tree a medium grower. Fruit of medium size, ovate, pyriform; skin yellowish russet green, sprinkled with russet dots. Flesh coarse-grained, not juicy, but sweet and of a pleasant flavour. Season October.

Dr. Gromier.—Tree a strong grower. Fruit below medium size, roundish, pyriform ; skin green, with a bronze-red cheek and small patches of russet. Flesh white, juicy, breaking, sweet, with a pleasant flavour. Season October.

Luizette.—Tree a medium grower. Fruit above medium size, oblong, obtuse, pyriform : skin greenish yellow, with a little red on the sunny side. Flesh whitish, fine grained, buttery, juicy, sweet. Season last of October.

King Charles.—Tree a vigorous grower. Fruit large, oblong, obtuse, pyriform; skin greenish, nearly covered with russet and sprinkled with yellow dots. Flesh white, fine grained, juicy, slightly astringent. Season last of October and November.

Calixte Mignot.—Tree a moderate grower. Fruit below medium size, long, smooth, pyriform; skin smooth, yellow, with a russet-reddish cheek and a few small brown dots. Flesh white, fine grained, juicy, with a pleasant flavour. Season November.

Sirenisher.—Tree a vigorous grower. Fruit of medium size or below medium, roundish, obovate ; skin green, shading to yellowish-green. Flesh white, juicy, tender, melting, with a sweet pleasant flavour. Season November.

PLUMS.

The plum trees never were more promising or more laden with bloom than last spring, even very small trees recently planted were full of flower, but beginning to blossom as they did in the latter part of March, and in the first part of April, when the weather was unfavourable for the proper fertilization of the flowers or for the development of the young plum, the result was disappointing. At the same time much wet weather prevented effective spraying, and was favourable for the development of fungus diseases, and in many cases the brown rot had attacked the fruit before it was half grown. A few of the trees were sprayed seven times from just before the breaking of the buds until the fruit was three-quarters grown, but the spraying was of little benefit, often being washed off soon after it had been applied, and thus did not prevent the rot. Some varieties appear to be particularly susceptible of rot and are a menace to other sorts that perhaps would otherwise escape. In the following list short descriptions are given of those sorts that fruited for the first time this season :—

Meroldt's Reine Claude.—Tree a strong grower. Fruit below medium size, globular, with a shallow suture ; skin pale yellow. Flesh yellowish, firm, not juicy or very sweet. Season middle of September.

Metz Mirabelle.—Tree a strong grower. Fruit small, globular; skin yellow. Flesh yellow, firm, juicy, sweet, stone very small. Season middle of August.

Brauman.—Tree a medium grower. Fruit small to medium, globular ; skin greenish yellow, with a whitish bloom. Flesh greenish, not juicy, sweet, with a pleasant flavour. Season last of August.

Chester.—Tree a strong grower. Fruit below medium size, oval ; skin dark red or nearly purple, with a thin bloom. Flesh greenish, moderately juicy, sweet. Season early September.

Montfort.—Tree a medium grower. Fruit of medium size, globular, with a deep suture ; skin reddish purple, with a white bloom. Flesh greenish, not juicy, sweet, with a pleasant flavour. Season last of August.

Catharine.—Tree a medium grower. Fruit medium to large, egg-shaped ; skin reddish, with a white bloom. Flesh yellow, sweet, juicy, with a pleasant flavour. Season last of August.

Late Muscatel.—Tree a strong grower. Fruit of medium size, roundish, one side enlarged ; skin reddish with a white bloom. Flesh greenish, sweet, rather dry, of good flavour. Season early September.

Throop.—Tree a strong grower. Fruit below medium size, oval, tapering to each end ; skin light red, with a whitish bloom. Flesh yellowish, and very juicy, sweet, with a pleasant flavour. Season early September.

Red Egg.—Tree a vigorous grower. Fruit small, oblong with neck, one side enlarged ; skin reddish. Flesh yellowish, sweet, rather dry, and granular. Season early September.

Dry's Seedling.—Tree a free grower. Fruit small to medium, oval ; skin reddish yellow, with a few brown dots. Flesh yellow, sweet and juicy, with a pleasant flavour. Season early September.

Partridge.—Tree a strong grower. Fruit of medium size, roundish, with a suture ; skin red, with a white bloom. Flesh yellowish, rather dry, sweet, with a pleasant flavour. Season early September.

Blue Egg.—Tree a medium grower. Fruit below medium size, oblong, egg-shaped, with a shallow suture ; skin light red, with a white bloom. Flesh yellowish, firm, moderately juicy, sweet, with a pleasant flavour. Season middle of September.

Swan's Yellow.—Tree a strong upright grower. Fruit of medium size, roundish, globe-shaped, suture deep, with a depression at each end. Flesh yellow, juicy, a little coarse, moderately sweet, with a pleasant flavour. Season middle of September.

Britzer Egg.—Tree a vigorous grower. Fruit below medium size, egg-shaped ; skin yellow. Flesh yellow, juicy, sweet, with a pleasant flavour, a little coarse in the grain. Season middle of September.

Niemburg Egg.—Tree a vigorous grower. Fruit of medium size, egg-shaped ; skin pale, dull red, with a whitish bloom. Flesh yellow, firm, moderately juicy, sweet, with a pleasant flavour. Season early and middle of September.

Steptoe.—Tree a strong grower. Fruit below medium size, egg-shaped ; skin purple, with a thin bloom. Flesh yellowish, juicy and sweet, with a pleasant flavour. Season September.

Mistake.—Tree a strong grower. Fruit above medium size, oblong oval, with a suture and one side enlarged ; skin purple, with a white bloom. Flesh yellowish, a little coarse, juicy, sweet, with a pleasant flavour. Season September.

Large English Damson.—Tree a strong and upright grower. Fruit a large Damson ; skin purple, with a thin bloom. Flesh greenish, juicy, with a pleasant flavour. Season last of September.

The varieties of trees with fruit free or nearly free from rot this year were Monarch, Mitchelson, Sultan, Annie Spath, Clyman, Cochet Pere and Blue Apricot. Of those described as fruiting for the first time, some were free from rot and some were not, but another season will give more evidence on which to base an opinion as to their power to resist this disease.

CHERRIES.

The cherry trees were very full of bloom this year, but during the blossoming period there were two frosts, and almost continuous cold rains, and most of the blossoms failed to fertilize, and as the rains continued through May and most of June, spraying was not effective, and the few cherries that did grow were many of them destroyed by the brown rot. A few of the young trees produced a few specimens, some of which, if they can be protected from the rot will be of value in this province.

The following brief descriptions are presented as to the character and date of ripening of the new sorts which have fruited here for the first time this season :—

Royal Morello.—Tree a medium grower. Fruit medium to small, round flattened; skin bright glossy red. Flesh juicy, pleasant, sprightly acid, firm. Season early July.

Winkler's White.—Tree a strong grower. Fruit medium to large, heart-shaped, skin yellowish red. Flesh firm, juicy, sweet. Season early July.

Kircheimer.—Tree a strong grower. Fruit of medium size, roundish oval ; skin dark glossy red. Flesh mild, pleasantly acid. Season early July.

Fromm's Heart.—Tree a strong grower. Fruit of medium size, heart-shaped ; skin dark glossy red. Flesh firm, juicy, sweet, and of pleasant flavour. Season early July.

Beauty of Marienhohe.—Tree a strong grower. Fruit small, roundish heart-shaped; skin light red with golden dots. Flesh yellowish, moderately juicy, sweet, Season early July.

Seedling No. 1.—Tree a vigorous grower. Fruit large, obtusely heart-shaped; skin glossy red. Flesh firm, juicy, sweet with a pleasant flavour. Season early July.

Seedling No. 2.—Tree a moderate grower. Fruit medium to large, heart-shaped ; skin bright red. Flesh firm, moderately juicy, sweet. Season early July.

Seedling No. 4.—Tree a strong grower. Fruit large, obtusely heart-shaped ; skin yellowish red. Flesh yellowish, juicy, tender, pleasantly acid. Season early July.

Seedling No. 9.—Tree a strong grower. Fruit small to medium in size, heart-shaped ; skin dark red. Flesh tender, juicy, moderately sweet, with a pleasant flavour. Season early July.

Guben.—Tree a medium grower. Fruit of medium size, round, flattened ; skin dark glossy red. Flesh red, tender, juicy, and pleasantly acid. Season early July.

Hedelfinger.—Tree a strong grower. Fruit large, heart-shaped ; skin dark red. Flesh firm, sweet, with a pleasant flavour. Season middle of July.

Schmehls.—Tree a vigorous grower. Fruit large, obtusely heart-shaped ; skin mottled, yellow and pale red. Flesh tender, juicy, and sweet, with a pleasant flavour. Season middle of July.

Seedling No. 19.—Tree a medium grower. Fruit of medium size, oval ; skin yellowish red. Flesh tender, juicy and sweet, with a pleasant flavour. Season middle of July.

Weichsel Ostheim.—Tree a medium grower. Fruit of medium size, roundish ; skin dark glossy red. Flesh juicy, tender, slightly acid, with a pleasant flavour. Season middle and last of July.

Lucien.—Tree a strong grower. Fruit heart-shaped ; skin pale yellowish red. Flesh juicy, tender, sweet and rich. Season middle of July.

Berlin Amarelle.—Tree a vigorous grower. Fruit medium to large, oval ; skin dark glossy red. Flesh tender, juicy and pleasantly acid. Season middle and last of July.

Germersdorf.—Tree a strong grower. Fruit large, obtusely heart-shaped ; skin glossy red. Flesh yellowish red, tender, juicy, sweet, with a pleasant flavour. Season last of July.

Princess.—Tree a moderate grower. Fruit very large, heart-shaped ; skin light red. Flesh pale yellowish red, tender, juicy, sweet, with a pleasant flavour. Season, middle and last of July.

Shadow Amarelle.—Tree a medium grower. Fruit of medium size, oval ; skin dark red. Flesh dark red, tender, juicy, mildly acid, with a pleasant flavour. Season, middle and last of July.

PEACHES, APRICOTS AND NECTARINES.

The peach, apricot and nectarine trees were very beautiful with bloom about the last of March. One peach and not one apricot or nectarine was the result from the

* These seedlings under numbers have all been produced at the Experimental Farm.

orchards on the valley level. On the mountain, at about 600 feet elevation, a few Amsden and Foster trees had a light crop.

ALMONDS.

The Hard-shell Almonds bloomed but bore no fruit, and none of the soft-shell varieties have ever had any fruit, while the trees are large and thrifty and old enough to have borne several crops. As these seem to be useless in this climate, it is scarcely worth while continuing their cultivation.

QUINCES.

Constantinople.—Tree a free grower. Fruit medium size, pear-shape ; skin smooth clear orange.

MEDLARS.

All the medlars produced a crop, blooming as they do very late in May, they are pretty sure of mild weather, and always produce a crop.

GRAPES.

The grape vines made a vigorous growth, but were very late in starting and also very late in blooming, averaging 21 days later than previous years. The fruit in most instances failed to set and even the earliest sorts were not nearly ripe by October 1.

SMALL FRUITS.

There was a fairly good crop of small fruits this year. The blossoms were somewhat injured by the cold rains, and the frequent rain in June made the strawberries soft, and much of the crop was unfit for any but a local market. The rain also injured the currants, but the raspberries, black caps and black berries had fine weather for ripening and were of very good quality.

RED AND WHITE CURRANTS.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Knight's Early (red.)	July 7	Vigorous ...	Small	Cluster short, fairly well filled, good flavour.	Moderately productive.
La Fertile.....	" 7	" ..	Large	Cluster long, well filled, very good quality.	Productive.
New Red Dutch	" 7	" ..	Large medium	Cluster medium in length, well filled, good quality.	"
La Turinese....	" 7	" ..	Medium	Cluster medium in length, well filled, good quality.	"
Fay's Prolific..	" 7	" ..	Large	Cluster long, well filled, good quality.	"
Large White Brandenburg	" 7	" ..	"	Cluster long, well filled, sweet, good flavour, very fine.	"
Frauendorfer (red.)	" 7	" ..	"	Cluster long, well filled, good flavour.	"
Verrier's White	" 7	" ..	Large medium	Cluster long, not well filled, good flavour.	Moderately productive.
Chenonceau (red.)	" 7	" ..	Large	Cluster long, well filled, sweet, fine flavour.	Productive.
Eyatt's New White.	" 7	" ..	Large medium	Cluster long, fairly well filled, good flavour.	"
Red Gondoin...	" 8	" ..	Small	Cluster short, not well filled, poor quality.	Not productive.
White Pearl....	" 8	" ..	Medium.....	Cluster medium in length, not very well filled, good flavour.	Moderately productive.
Victoria	" 8	" ..	Large	Cluster medium in length, not well filled, fairly good flavour.	"
Red Cherry....	" 8	" ..	"	Cluster long, moderately well filled, quality fair.	"
No. 51.....	" 8	" ..	Small	Cluster short, fairly well filled, sweet, good flavour.	"
London Red...	" 8	" ..	Large medium	Cluster long, fairly well filled, small, good flavour.	Productive.
White Esperen	" 9	" ..	Small	Cluster, short, fairly well filled, sweet. good flavour.	Moderately productive.
Large White...	" 9	" ..	Large medium	Cluster medium in length, well filled, good flavour.	Productive.
Rankin's Red..	" 10	" ..	Small	Cluster short, acid, not very good.	Not productive.
La Hative.....	" 10	" ..	Medium.....	Cluster medium, sweet, good.	Productive.
Moore's Ruby..	" 10	" ..	Small...	Cluster medium in length, not well filled, acid, fair flavour.	Moderately productive.
Prince Albert..	" 10	" ..	Large medium	Cluster long, moderately well filled, good flavour.	"
White Grape...	" 10	" ..	" ..	Cluster medium in length, well filled, good quality.	"
Versailles (red.)	" 10	" ..	Medium.....	Cluster medium in length, well filled, good quality.	"
North Star.....	" 10	" ..	"	Cluster medium in length, fairly well filled, good flavour.	Productive.
Red Dutch.....	" 10	" ..	"	Cluster medium in length, well filled, acid, but good flavour.	"
La Conde	" 10	" ..	"	Cluster medium in length, not well filled, good flavour.	Moderately productive.
White Imperial.	" 10	Moderately vigorous.	Large medium	Cluster medium in length, fairly well filled, sweet, good flavour.	"
Large White Dessert.	" 12	Vigorous ...	Large	Cluster long, well filled, acid, good flavour.	"
Large Red.....	" 12	" ..	Medium.....	Cluster long, well filled, good flavour.	"

RED AND WHITE CURRANTS—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
English Red...	" 12	" ..	Large medium	Cluster long, well filled, good quality.	Productive.
Raby Castle....	" 12	" ..	Large	Cluster long, well filled, acid, good flavour.	"
Champaigner (white.)	" 12	" ..	Small	Cluster medium in length, fairly well filled, good flavour.	Moderately productive.
Ringen's (red)..	" 13	" ..	"	Cluster medium in length, fairly well filled, good flavour.	Productive.
White Cherry..	" 15	" ..	Large medium	Cluster long, well filled, sweet, good flavour.	"
Beauty of St. Giles.	" 15	Moderately vigorous.	Large	Cluster long, well filled, good flavour.	"
De la Rochepoze	" 15	" ..	Small	Cluster short, not very well filled, acid, fair flavour.	Moderately productive.
White Dutch...	" 15	Vigorous ...	Medium	Cluster medium in length, well filled, acid, good flavour.	"
White Transparent.	" 15	" ..	"	Cluster medium in length, fairly well filled, good flavour.	"

BLACK CURRANTS.

Ruler.....	July 8	Vigorous....	Medium	Cluster medium in length, mild, sweet, good flavour.	Moderately productive.	
Stirling.....	" 8	" ..	"	Cluster medium in length, flavour a little rank.	"	"
Bang Up.....	" 8	" ..	Large	Cluster long, mild, sweet flavour.	"	"
Dominion .. .	" 10	" ..	Medium	Cluster short, mild, good flavour.	"	"
Lennox	" 10	" ..	"	Cluster medium in length, fairly good flavour.	"	"
Ambrafarbidge.	" 10	" ..	Large	Cluster medium in length, mild, good flavour.	"	"
Victoria	" 10	" ..	"	Cluster medium in length, sweet, good flavour.	Productive.	
Gewohnliche...	" 10	" ..	"	Cluster short, mild, good flavour.	Moderately productive.	
Beauty	" 10	" ..	Medium.....	Cluster short, sweet, fairly good flavour.	Not productive.	
Star.....	" 10	" ..	"	Cluster medium in length, sweet, pleasant flavour.	Moderately productive.	
London.....	" 11	" ..	"	Cluster medium in length, good quality.	"	"
Success..	" 11	" ..	"	Cluster long, sweet, mild flavour.	"	"
Parker	" 11	" ..	Small	Cluster medium in length, flavour rank.	"	"
Pearce.....	" 12	Moderately vigorous.	Medium.....	Cluster medium in length, mild, pleasant flavour.	"	"
Middlesex	" 12	Moderately vigorous.	Medium.....	Cluster medium in length, quality fair.	"	"
Kentish Hero..	" 12	Vigorous ..	"	Cluster medium in length acid good flavour.	Productive.	
Stewart.... ...	" 12	" ..	"	Cluster medium in length, flavour a little rank.	"	
Wood.....	" 12	" .	" ...	Cluster medium in length, fair quality.	Moderately productive.	
Lanark	" 12	" ..	"	Cluster short, flavour rank..	"	"
Eagle	" 12	" ..	Large medium	Cluster long, thick skin, flavour rank.	"	"

BLACK CURRANTS—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Black Naples	July 12	Vigorous	Large medium	Cluster long, sweet, mild flavour.	Moderately productive.
Ethel	" 12	Moderately vigorous.	Medium	Cluster medium in length acid fair flavour.	" "
Oxford	" 14	Vigorous	"	Cluster medium in length, quality fair.	Not productive.
Norton	" 14	"	"	Cluster medium in length, mild, sweet, good flavour.	Productive.
Bella	" 14	"	Small	Cluster short, flavour rank	Not productive.
Monarch	" 14	"	Medium	Cluster long, flavour good	Productive.
Lee's Prolific	" 15	"	"	Cluster medium in length, flavour fairly good.	"
Kentville	" 16	"	"	Cluster short, acid, flavour rank.	Moderately productive.
Henry	" 17	"	"	Cluster long, sweet, good flavour.	Productive.
Ogden's Black	" 17	"	"	Cluster short, flavour rank.	"
Ontario	" 17	"	Large	Cluster long, acid, flavour rank.	Moderately productive.
Climax	" 17	"	"	Cluster long, acid, quality fair.	Productive.
Pomona	" 18	"	Very large	Cluster long, sweet, good flavour, the best we have.	"
Prince of Wales	" 18	"	Large	Cluster long, sweet, good flavour, next in quality to Pomona.	"
Lewis	" 18	"	Small	Cluster medium in length, sweet, good flavour.	Moderately productive.
Baldwin	" 20	Not vigorous	"	Cluster short, not very good qualty.	" "
Manitoba Wild	" 20	Vigorous	"	Cluster short, flavour rank	Not productive.

RED AND YELLOW RASPBERRIES.

Hansell	June 27	Vigorous	Small	Crumbly, light red, round, good flavour.	Productive.
Thompson	July 1	"	"	Moderately firm, round, bright red, good flavour.	"
Crimson Beauty	" 1	Moderately vigorous.	Medium	Firm, round, bright red, good flavour.	"
Marlboro	" 1	Vigorous	Small	Firm, round, bright red, good flavour.	"
Champion	" 1	"	"	Soft, sweet, quality only fair.	Moderately productive.
Phoenix	" 1	"	Large	Firm, round, bright red, good flavour.	Productive.
Battler's Giant	" 1	"	Medium	Moderately firm, dark red, fair flavour.	"
Arnold's Hybrid	" 1	"	"	Crumbly, round, light red, fair flavour.	Moderately productive.
Paragon	" 1	"	Large medium	Firm, bright red, sweet, fair quality.	Productive.
Northumberl'nd Fill Basket.	" 3	"	Very large	Firm, conical, dark red, very good quality.	"
Belle de Fontenay.	" 4	"	Large medium	Firm, dark red, round, good quality.	"
Carter's Prolific	" 4	Moderately prolific.	Small	Firm, sweet, fair flavour	"
Sugar of Metz	" 4	Vigorous	Large medium	Soft, yellow, round, sweet, not of very much value.	"
New Fastollf	" 6	"	Large	Firm, conical, dark red, sweet, good quality; continues long in bearing.	"

RED AND YELLOW RASPBERRIES—*Continued.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Large Yellow..	July 6	Vigorous ...	Large	Firm, obtuse, conical, dull yellow, sweet.	Productive.
Lord Beaconsfield.	" 6	" ..	"	Firm, round, a bright red, sweet, good flavour.	"
Herrenhauser Red Perpetual	" 6	" ...	Medium	Firm, round, dark red, sweet, fair flavour.	Moderately productive.
R. B. Whyte.	" 6	" ...	Large	Moderately firm, round, dark red, sweet, good flavour.	Productive.
Garnet.....	" 6	" ..	Small	Firm, purplish-red, round, not very good quality.	Not productive.
Malta	" 6	Moderately vigorous.	Medium	Soft, yellow, round, good flavour.	"
French Vice-President.	" 8	Vigorous....	Very large	Firm, conical, dark red, sweet, good flavour, but adheres too tightly to the core.	Productive.
Knevit's Giant.	" 8	" ...	Large	Crumbly, round, bright red, sweet, good flavour.	"
Autumn Surprise.	" 10	" ...	Large medium	Soft, yellow, round, not very good.	"
Baumforth Seedling.	" 10	Moderately vigorous.	Small medium	Moderately firm, round, dark red, sweet, flat flavour.	"
Wilder	" 10	Vigorous....	Medium.....	Moderately firm, sweet, fairly good flavour.	Not productive.
Brinckle's Orange.	" 10	" ...	Large	Soft, sweet, good flavour	Productive.
Golden Queen.	" 10	" ...	"	Firm, sweet, good; best yellow raspberry we have.	"
All Summer....	" 10	" ...	"	Firm, conical, bright red, good flavour.	"
Muskingum....	" 10	" ...	Small medium	Crumbly, dark red, sweet....	"
Caribou Wild ..	" 10	" ...	Small	Soft, crumbly, tart, good flavour.	Not productive.
Turner	" 10	" ...	"	Crumbly, round, bright red, sweet.	"
Sarah	" 10	" ...	Large medium	Firm, round, bright red, very good quality.	"
Guinea	" 10	Feeble.....	Small.....	Round, purplish red, not good.	Not productive.
Mary	" 10	Vigorous ..	"	Round, red, poor flavour.....	"
Lady Anne ...	" 10	" ...	"	Yellow, soft, flat flavour.....	"
Sharpe	" 10	Feeble.... .	"	Red, sweet, not very good...	"
Craig	" 10	Vigorous ...	Medium	Rather soft, clear red, good flavour	Productive.
Percy	" 13	Moderately vigorous.	Large medium	Firm, purplish red, sweet, good flavour.	Moderately productive.
Muriel	" 13	Vigorous ...	" ..	Firm, dark red, round, good flavour.	" "
Bee Hive	" 13	" ...	" ..	Crumbly, dark red, sweet, good flavour.	" "
Queen of the Market.	" 13	" ...	Large	Firm, dark red, sweet, good quality; like Cuthbert.	Productive.
Red Herrenhauser.	" 13	" ..	Medium	Firm, large, dark red, round, fair flavour.	"
Shaffer's Colossal.	" 13	" ...	Large	Firm, purplish red, acid	"
Garfield..	" 13	" ...	Medium	Moderately firm, red, round, good flavour.	"
La Mercier.....	" 14	Moderately vigorous.	Large	Crumbly, large, round, dark red, sweet, good flavour.	"
Chili	" 14	Vigorous ...	Large medium	Moderately firm, large, dark red, sweet, good flavour.	"
Duke of Brabant	" 14	" ...	Large	Firm, roundish conical, bright red, sweet, very good quality	"

RED AND YELLOW RASPBERRIES—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Col. Wilder	July 14	Feeble	Medium	Soft, pale yellow, sweet, not of much value.	Moderately productive.
Empire	" 15	"	Small	Firm, round, acid, not very good.	Not productive.
Hebner	" 15	Vigorous	Medium	Soft, red, sweet, good flavour, not of much value.	"
Cuthbert	" 15	"	Large	Firm, conical, dark red, very good quality.	Very productive.
Hornet	" 15	Feeble	Small medium.	Moderately firm, large, fair flavour.	Moderately productive.
Clarke	" 15	Vigorous	Medium	Moderately firm, conical, red, sweet, fair flavour.	Productive.
Carleton	" 15	"	"	Firm, round, red, sweet, good flavour.	"
Fastolff	" 17	"	"	Firm, red, sweet	"
Pauline	" 17	"	Large	Rather soft, round, dark red, crumbly, sweet, good flavour.	"
Miller	" 17	"	Medium	Large, round, red, sweet, good flavour.	"
Nonpareil	" 17	"	Small	Moderately firm, bright red, sweet, good flavour.	"
Barnet	" 17	Moderately vigorous.	Medium	Soft, round, red, sweet, not good quality.	Not productive.
Oregon Late	" 17	"	"	Firm, sweet, fair flavour.	"
Lizzie	" 24	Feeble	"	Round, red, sweet.	Moderately productive.
Franconia	" 24	Moderately vigorous.	Small	Not of any value.	" "
Queen Victoria.	" 24	Vigorous	Medium	Crumbly, red, quality fair	" "
Sir John.	" 24	"	Small medium	Crumbly, red, acid, not of much value.	Productive.
Goliath	" 24	"	Large medium	Moderately firm, round, dark red, sweet, good flavour.	"
Prince of Wales	" 24	Moderately vigorous.	Medium	Firm, round, dark red, sweet, good flavour.	Moderately productive.

BLACK CAP RASPBERRIES.

Smith's Prolific.	July 7	Vigorous	Medium	Fairly good quality	Productive.
Early Ohio	" 10	"	Large medium	Not very good quality.	"
Nemaha.	" 10	"	Large	Fine flavour, good quality	"
Older.	" 15	"	Large medium	Good quality	"
Conrath	" 16	"	Large	A fine flavoured, handsome berry ; a little acid.	"
Lovett	" 16	Moderately vigorous.	Medium	Good quality	"
Cromwell	" 16	Vigorous	"	Fairly good quality	"
American Yellow Cap.	" 18	"	Small	Sweet, good quality	"
Kansas	" 20	"	Medium	" "	"
Palmer	" 20	"	"	Fairly good quality	"
Ada	" 20	"	"	" "	"
Gregg	" 21	"	Large	Very good quality.	"
Progress	" 23	"	"	Sweet, good quality	"
Jackson's May King.	" 23	"	Small medium	Poor quality	Moderately productive.
Hopkins	" 23	"	Medium	Good quality	Productive.

BLACKBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Berry.	Quality.	Productiveness.
Early King	Aug. 6	Vigorous	Large medium	Good quality	Productive.
Minnewaska	" 6	"	"	Firm, good quality	"
Early Harvest	" 7	"	Medium	Quality only fair	Not productive.
Early Cluster	" 7	"	"	Sweet, firm, good quality	Productive.
Agawam	" 7	"	Large medium	Fine appearance and good quality.	"
Snyder	" 7	"	"	Very good quality	"
Hansel	" 8	Moderately vigorous.	Small	Not very good quality	Moderately productive.
Brunton	" 8	Feeble	"	Not good quality	Not productive.
Ohmer	" 8	Moderately vigorous.	Large	Fairly good quality	Productive.
Stone's Hardy	" 10	Vigorous	Large medium	Firm, sweet, good quality	"
Erie	" 10	"	Large	A little acid, but good quality	Moderately productive.
Taylor's Prolific	" 10	"	"	Sweet, good quality	Productive.
Eldorado	" 10	"	Very large	Sweet, very fine flavour, good quality.	"
Wilson's Early	" 12	"	Large medium	Firm, good quality	"
Tecumseh	" 14	Moderately vigorous.	Small	Not very good quality	Not productive.
Kittatinny	" 14	Vigorous	Large medium	Acid; fairly good quality	Moderately productive.
Wilson Junior	" 10	"	Medium	Good quality	Productive.
Maxwell	" 10	Moderately vigorous.	"	Not very good quality	Moderately productive.
Lawton	" 10	Vigorous	Large medium	Quality fair	" "
Oregon Everbearing.	Aug. 10 to Oct. 15	Very vigorous.	Large	Quality good when very ripe, a little acid.	Very productive.

STRAWBERRIES.

Arrow	June	7	Vigorous	Medium	Firm; bright red; sweet, good flavour.	Productive.
Eleanor	"	7	"	Large medium	Firm; dark red; round; good flavour, sweet.	"
Dayton	"	7	"	Large	Firm; deep red; conical; sweet, good flavour.	"
Chairs	"	7	"	Large medium	Firm; bright red; conical; sweet, fine flavour.	"
Anna Kenedy	"	8	"	Medium	Firm; sweet, good quality	"
Van Deman	"	9	"	"	Firm; dark red; conical; good quality.	"
Alpha	"	10	"	Large medium	Firm; red; round; fairly good quality.	Not productive.
Iowa Beauty	"	10	"	Large	Firm; bright red; very good quality.	Productive.
Alexander II	"	10	"	Medium	Firm; bright red; sweet, good flavour.	Moderately productive.
Omega	"	10	"	"	" "	Productive.
Bissel	"	10	"	Large	Rather soft; light red; irregular in shape; stem long and strong.	Moderately productive.
Timbrell	"	11	"	"	Firm; sweet, good quality; stem long and strong.	Productive.
Bonnie Lass	"	12	Moderately vigorous.	Medium	Firm; sweet, good quality	Moderately productive.
Brandywine	"	12	Vigorous	Large medium	Firm; conical; dark red; good quality; stem short.	" "

STRAWBERRIES—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Berry.	Quality.	Productiveness.
Warfield.....	June 17	Vigorous....	Medium.....	Firm; dark red; round; sweet, good flavour.	Productive.
Windsor Chief.	" 13	" ...	Large medium	Firm; deep red; conical; acid; good flavour.	"
Greenville.....	" 13	" ...	Large	Firm; bright red; round; even in size; very good quality.	"
Maxwell.	" 13	" ...	Large medium	Firm; light red; round; sweet, good quality.	"
Tennessee Prolific.	" 13	" ...	" ..	Firm; bright red; conical; a little acid; good quality.	"
Devereau	" 14	" ...	Medium.....	Moderately firm; light red; conical; good quality.	Moderately productive.
Mary....	" 15	" ...	Large medium	Firm; pale red; sweet, good quality.	" "
Weston.....	" 15	Moderately vigorous.	Medium.....	Fairly firm; conical; dark red; a little acid; fair flavour.	" "
Laxford Hall...	" 15	Vigorous ...	Large	Firm; light red; conical; even in size; good quality.	Productive.
Dr. Hogg.....	" 15	" ...	Medium.....	Firm; sweet, good flavour...	Moderately productive.
Crockett's Choice.	" 15	" ...	Small.....	Firm; dark red; conical; sweet, good flavour.	Not productive.
Improved Westbrook.	" 16	" ...	Large	Moderately firm; light red; fairly good quality.	Productive.
Michigan	" 17	" ...	Very large....	Firm; ripens unevenly and is uneven in shape; fairly good flavour.	Moderately productive.
H. W. Beecher.	" 17	" ...	Large	Firm; light red; sweet, good flavour.	Productive.
Improved Jucunda.	" 17	" ...	"	Firm; bright red; round; sweet, very good quality.	"
Magoon..	" 17	" ...	Very large...	Firm; bright red; sweet, good quality but a little uneven in shape.	"
British Queen..	" 12	" ...	Large.....	Firm, dark red, roundish conical, sweet, good flavour.	Moderately productive.
Imperial Newman.	" 17.	" ...	Medium.....	Firm, bright red, conical, good quality.	"
Sir Joseph Paxton.	" 18.	" ...	"	Firm, fair quality.....	"
Empress Eugenie.	" 18.	Moderately vigorous.	Small	Firm, sweet, good flavour....	"
Enchantress....	" 18.	" ..	Large	" "	"
Eclipse.....	" 18.	" ...	Small medium	Firm, light red conical, sweet, good flavour.	Not productive.
Arkansas Traveler.	" 19.	Vigorous....	Large	Firm, dark red conical, sweet, good flavour.	Productive.
Kansas Prolific.	" 19.	" ...	Very large.. .	Firm bright red, good quality, stem long and strong.	"
Laxton's Noble.	" 19.	Moderately vigorous.	Small	Poor quality.....	Not productive.
White Alpine..	" 27.	Vigorous....	Large.....	Firm, pinkish white, oblong, sweet, good flavour, stem long and strong.	Productive.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Degrees	Date of Lowest Temperature.	Degrees.	Rainfall.	Snowfall.	Sunshine.	
1900.		1900.		Inches.	Inches.	Hours.	Minutes.
December 18	56	December 30	27	7·5	8	47	18
1901.		1901.					
January 20	59	January 9	11	5·7	19	44	12
February 25	54	February 5	16	3·79	7	83	12
March 20	66	March 11	30	3·16		67	6
April 30	71	April 18	28	2·79	4	127	54
May 26	90	May 13	38	4·80		167	54
June 14	83	June 28	41	7 8		80	0
July 28	83	July 26	42	1·25		205	0
August 21	91	August 1	45			224	6
September 18	79	September 28	35	1·59		99	48
October 23	76	October 14	36	4·15		92	6
November 3	66	November 18	31	10 57		18	30
		Totals		51·30	30	1,157	6

The record for the year ending November 30 shows a low rate of sunshine for the year, and a light rainfall.

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS FOR THE YEAR ENDING JUNE 30, 1901.

CENTRAL EXPERIMENTAL FARM—EXPENDITURE, 1900-1901.

Live stock	$	935 65
Feed for stock, including veterinary services		998 53
Seed grain, seeds, trees, &c		437 70
Implements, tools, hardware and supplies		939 87
Drainage and drain tiles		1,501 91
Manure and fertilizers for experimental plots and Hort. dept.		263 73
Travelling expenses		1,491 73
Exhibition expenses		261 69
Blacksmithing, harness supplies and repairs		849 55
Bee department		160 00
Salaries		1,916 25
Wages, farm work, including experimental work with grain and other farm crops; also, salaries of officers in charge		6,607 45
Wages, care of stock		2,345 25
Chemical department proportion chargeable to the Central Farm		1,184 26
Botanical and Entomological department proportion chargeable to the Central Farm		1,299 92
Horticultural department, including salary of officer in charge		4,829 89
Poultry department, including salary of officer in charge		1,660 06
Forestry department and care of grounds		1,068 98
Arboretum		684 16
Distribution of trees and tree seed		78 24
Office help, correspondence branch and messenger service		4,378 13
Printing and stationery		588 29
Seed testing and care of greenhouses		944 62
Dairy department		649 44
Contingencies		308 54
Books and newspapers		122 03
Telegrams and telephones		161 69
Steers purchased for feeding experiments		3,445 40
Hogs purchased for feeding experiments		256 28
	$	40,369 24
Less—Proceeds of sale of steers purchased for feeding experiments		5,266 55
	$	35,102 69

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1900-1901.

Live stock	$	83 40
Feed for stock, including veterinary services		2,178 72
Seed grain, seeds, trees, &c		51 69
Implements, tools, hardware and supplies		382 31
Manure and fertilizers		29 98
Travelling expenses		309 01
Exhibition expenses		169 74
Blacksmithing, harness supplies and repairs		206 77
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,517 82
Wages, farm work, including experimental work with farm crops		2,310 91
Wages, care of stock		1,503 06
Chemical department, proportion chargeable to each branch farm		690 82
Botanical and Entomological department, proportion chargeable to each branch farm		525 00
Poultry department		129 91
Horticultural department, including salary of officer in charge		1,046 51
Forestry department, including care of grounds		112 00
Seed grain distribution		192 41
Contingencies, including postage, $28.10; mail delivery, $82.50		148 05
Printing and stationery		8 34
Books and newspapers		21 50
Telegrams and telephone		39 24
Steers purchased for feeding experiments		1,434 00
Drainage and drain tiles		98 25
	$	14,279 44
Less—Proceeds of sale of steers purchased for feeding experiments		2,203 03
	$	12,076 41

EXPERIMENTAL FARM, BRANDON, MANITOBA—EXPENDITURE, 1900–1901.

Live stock	$	30 89
Feed for stock, including veterinary services		71 65
Seed grain, seeds, trees, &c		111 04
Implements, tools, hardware and supplies		248 30
Travelling expenses		30 55
Exhibition expenses		193 00
Blacksmithing, harness supplies and repairs		255 18
Bee department		2 00
Salary of superintendent, also proportion of salaries for general work, Ottawa		2,617 81
Wages, farm work, including experimental work, with farm crops, &c		2,560 30
Wages, care of stock		872 25
Chemical department, proportion chargeable to each branch farm		690 82
Botanical and entomological department, proportion chargeable to each branch farm		525 00
Horticultural department		252 82
Forestry department, including care of grounds		474 50
Poultry department		50 90
Office help, including delivery of mail, $121.00		798 00
Seed grain distribution		528 24
Tree distribution		270 76
Contingencies, including postage, $55.00		99 31
Printing and stationery		45 67
Books and newspapers		20 40
Telegrams and telephones		54 30
Steers purchased for feeding experiments		562 25
	$	11,365 94
LESS—Proceeds of sale of steers purchased for feeding experiments		872 19
	$	10,493 75

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE, 1900–1901.

Live stock	$	20 00
Feed for stock, including veterinary services		49 25
Seed grain, seeds, trees, &c		64 10
Implements, tools, hardware and supplies		271 61
Travelling expenses		32 85
Exhibition expenses		46 75
Blacksmithing, harness supplies and repairs		139 75
Salary of superintendent, also proportion of salaries for general work, Ottawa		2,617 81
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c		2,816 22
Wages, care of stock		808 50
Chemical department, proportion chargeable to each branch farm		690 82
Botanical and entomological department, proportion chargeable to each branch farm		525 00
Horticultural department		386 30
Poultry department		67 10
Forestry department, including care of grounds		211 67
Office help		612 33
Seed grain distribution		448 34
Tree distribution		204 27
Contingencies, including postage, $105.82		130 17
Printing and stationery		45 60
Telegrams		34 23
Books and newspapers		14 00
Steers purchased for feeding experiments		597 90
	$	10,834 57
LESS—Proceeds of sale of steers		1,204 40
	$	9,630 17

EXPERIMENTAL FARM, AGASSIZ, B.C.—EXPENDITURE, 1900–1901.

Live stock		123 37
Feed for stock, including veterinary services		60 59
Seed grain, seeds, trees, etc.		231 76
Implements, tools, hardware and supplies		190 97
Manure and fertilizers		180 94
Travelling expenses		74 25
Exhibition expenses		130 75
Blacksmithing, harness supplies and repairs		124 70
Salary of superintendent, also proportion of salaries for general work, Ottawa		2,517 81
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c		2,315 66
Wages care of stock		417 25
Chemical department, proportion chargeable to each branch farm		690 82
Botanical and entomological department, proportion chargeable to each branch farm		525 00
Poultry department		149 95
Forestry department		197 40
Office help		120 00
Seed grain distribution		173 48
Tree distribution		19 19
Clearing land		477 00
Contingencies, including postage, $65.23		102 97
Printing and stationery		3 65
Books and newspapers		19 00
Telegrams		2 65
Drainage and drain tiles		357 86
Bee department		1 00
Steers purchased for feeding experiments		75 00
	$	9,283 02
Less—Proceeds of sale of steers		484 00
	$	8,799 02

SUMMARY.

Central Experimental Farm	$	35,102 69
Nappan "		12,076 41
Brandon "		10,493 75
Indian Head "		9,630 17
Agassiz "		8,799 02
Seed grain distribution from Central Experimental Farm		3,897 96
Printing bulletins and distribution of bulletins and reports. $ 5,500 00		
Less special sum in estimates for this item 5,500 00		
	$	80,000 00

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &c., ON HAND DECEMBER 31, 1901.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

19 Horses	$	2,335 00
9 Ayrshire cattle		1,775 00
9 Guernsey cattle		1,540 00
9 Durham cattle (Shorthorns)		2,140 00
30 Grade cattle		600 00
8 Yorkshire swine		245 00
11 Berkshire swine		243 00
3 Tamworth swine		110 00
18 Grade swine		180 00
4 Large black swine		100 00
18 Shropshire sheep		810 00
11 Leicester sheep		275 00
7 Grade sheep		35 00
Farm machinery and implements		2,780 50
Vehicles, including farm wagons and sleighs		1,158 70
Hand tools, hardware and sundries		1,201 45
Harness		446 80
Dairy department, machinery, &c		618 85
Horticultural and forestry departments, implements, tools, &c		582 55
Botanical department, implements, tools, &c		9 95
Poultry department, 314 fowls		295 00
Poultry department, implements, furnishings, &c		98 11
Bees and apiarian supplies		483 28
Chemical department, apparatus and chemicals		1,985 00
Books in several departments		495 85
Greenhouse plants, supplies, &c		1,836 75
Furniture at Director's house		1,065 78
Office furniture and stationery		1,269 35
		24,715 92

EXPERIMENTAL FARM, NAPPAN, N.S.

6	Horses	$ 715 00
7	Guernsey cattle	1,110 00
6	Holstein cattle	270 00
9	Ayrshire cattle	710 00
2	Jersey cattle	200 00
44	Grade cattle	1,212 00
2	Yorkshire swine	45 00
3	Berkshire swine	70 00
1	Tamworth swine	20 00
63	Grade swine	330 00
34	Sheep	296 00
38	Fowls	19 50
	Bees and apiarian supplies	27 50
	Vehicles, including farm wagons and sleighs	325 00
	Farm machinery	560 00
	Farm implements	218 50
	Hand tools, hardware and sundries	394 72
	Harness	186 50
	Furniture for reception room and bedroom for visiting officials	157 50
	Furniture supplies and books for office	90 00
		6,957 22

EXPERIMENTAL FARM, BRANDON, MANITOBA.

12	Horses	$ 1,035 00
4	Ayrshire cattle	210 00
8	Durham cattle	640 00
1	Guernsey bull	100 00
1	Holstein cattle	30 00
6	Grade cattle	125 00
2	Tamworth swine	30 00
6	Berkshire swine	60 00
2	Yorkshire swine	30 00
4	Grade swine	12 00
68	Fowls	68 00
	Bees and apiarian supplies	123 95
	Vehicles, including farm wagons and sleighs	467 00
	Farm machinery	992 00
	Farm implements	610 00
	Hand tools, hardware and sundries	633 50
	Harness	216 50
	Furniture for reception room and bedroom for visiting officials	161 55
	Furniture supplies and books for office	286 80
		5,831 30

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

13	Horses	$ 1,310 00
1	Ayrshire bull	75 00
17	Durham cattle	1,545 00
1	Guernsey bull	75 00
18	Grade cattle	485 00
12	Berkshire swine	115 00
16	Tamworth swine	105 00
2	Yorkshire White swine	30 00
68	Fowls	47 00
	Bees and apiarian supplies	33 75
	Vehicles, including farm wagons and sleighs	498 50
	Farm machinery	1,036 00
	Farm implements	649 00
	Hand tools, hardware and sundries	518 05
	Harness	156 50
	Furniture for reception room and bedroom for visiting officials	167 50
	Furniture supplies and books for office	364 90
		7,211 20

EXPERIMENTAL FARM, AGASSIZ, B.C.

6	Horses	$ 375 00
13	Durham cattle	900 00
6	Grade cattle	155 00
9	Dorset horned sheep	102 50
5	Berkshire swine	60 00
6	Tamworth swine	60 00
9	Grade swine	27 00
51	Fowls	51 00
	Bees and apiarian supplies	33 05
	Vehicles, including farm wagons	200 00
	Farm machinery	533 55
	Farm implements	117 00
	Hand tools, hardware and sundries	202 60
	Harness	72 25
	Furniture for reception room and bedroom for visiting officials	136 40
	Furniture supplies and books for office	159 50
		3,184 85

W. H. HAY, *Accountant.*

INDEX

	PAGE
AGRICULTURIST—Report of	263
Barley, Mensury	299
cost of growing	300
Cattle—	
importations	264
Ayrshires	263-6
Guernseys	264-5
Shorthorns	263-4
Grades	267
Dairy cattle	266
Young stock	266
Carrots	307
varieties	307
cost of growing	307
Clover ensilage	302
cost of growing	303
Corn—Field crops of ensilage corn	304
King of the Earliest	304
Leaming	304
Longfellow	304
Mammoth Cuban	304
cost of growing	304
crop on the 200 acre farm	298
Dairy herd, the	266
financial statement	268
milk produced	267
rations fed	267
time of milking experiment	269
quality of milk experiment	272
milk records	276
summer feeding	267
Estimating cost of production of crops	298
Farm crops	298
Gluten meal	267
Mangels	305
Gate Post Red	305
Giant Yellow Globe	305
Golden Tankard	305
composition of	305
cost of growing	305
Meadows	301
remarks upon	301
cost of growing	302
Milk testing	277
Mixed crops	301
Oats, field crops	298
Banner	298
Goldfinder	299
Improved Ligowo	299
Scotch Potato	299
Siberian	299
Tartar King	299
Waverly	299
cost of growing	299
Pease—Blue Prussian	300
cost of growing	300
Pigs	291
Berkshires	291
Large Blacks	291
Tamworths	291
Yorkshires	291
experimental feeding of	292
importation of	291

	PAGE
AGRICULTURIST—Report of—*Con.*	
Pork—	
soft pork problem	294
pork production	292
Pumpkins, culture of	310
cost of growing	311
Rape	309
test of varieties	309
cost of growing	310
value for sheep	291
Sheep	290
Leicesters	290
Shropshires	290
importation of	290
Steer experiments	277
calves of 1900	287
calves of 1901	285
steers dehorned *versus* not dehorned	282
steers loose *versus* tied	282
" calves	280
" yearlings	280
" two year olds	281
" three year olds	281
" large *versus* small lot loose	283
profits in	278
general statement	279
different ages	279
choice of feeders	283
rations fed	278
Soil cultivation	295
Sugar Beets	307
cost of growing for sugar	308
cost of growing for forage	308
Turnips	306
Champion Purple Top Swede	306
Prize Purple Top Swede	306
cost of growing	306
harvesting, comparison of methods	306
Bedford, S. A., Superintendent, Experimental Farm, Brandon, Manitoba—Report of	395
Blair, W. S., Horticulturist, Experimental Farm, Nappan, N.S.—Report of	369
CHEMIST, Report of the	137
Acknowledgments	139
Alfalfa	175
and clover, yield from two and four cuttings	170
Ashes, wood	156
Assistant Chemists	139
Babbitt's Pure Potash lye	191
Basic slag (Thomas phosphate flour)	155
Bibby's cream equivalent	188
Butter, Canadian, as exported	190
By-products, corn	185
Calf meal, Bibby's cream equivalent	188
Canadian butter, as exported	190
Cattle feed	187
Chemists, assistant	139
Chemistry of insecticides and fungicides	191

PAGE

CHEMIST, Report of the—*Con.*
Clover.... 170
and Alfalfa, yield from two and four cuttings.. 170
and clover ensilage.. 177
Corn by-products, gluten meal, gluten feed, &c.. 185
Corn and corn ensilage.. 180
Correspondence.... 139
'Cover' crops and cultivation, relation of to soil moisture.. 149
Eel grass (*Zostera marina*).. 159
Ensilage, clover.. 177
corn.. 180
Fertilizers.. .. ..137, 152
Eel grass (*Zostera marina*).. 159
limestone.. 154
marl.. 154
mucks... .. ..152, 153
muds 153
Rock weed, composition of.. 158
sea-weed.. 158
tannery waste.. 157
analysis of.. 157
Thomas' phosphate flour (basic slag).. 155
wood-ashes.. 156
Fodders and feeding stuffs.. .. .. ..137, 160
Bibby's cream equivalent, calf meal.. 188
Canadian potato starch.. 189
calf meal.. 188
composition of.. 189
cattle feed.. 187
clover, analysis of before ensiling.. 178
analysis after ensiling.. 179
and clover ensilage.. 177
corn, analysis of before ensiling.. 181
analysis after ensiling.. 182
by-products of.. 185
and corn ensilage.. 180
feed stuffs, analysis of.. 188
gluten feed.. 185
meals.. 185
analysis of.. 186
grass pea (*Lathyrus sativus*).... .. 183
mangels.. 161
rice feed.. 187
composition of.. 188
roots.. 160
analysis of.. 161
albuminoid and non-albuminoid nitrogen in.. 166
changes in composition of during storage.. 163
composition of during storage. 165
nitrogen in dry matter in.... 165
Sugar beets.. 161
from North-west Territories, analysis of.. 167
from Manitoba, analysis of, 168, 169
from Prince Edward Island, analysis of.. .. ..169, 170
Yield of clover and Alfalfa from two and four cuttings.. 170
Clover.. .. ..170, 171, 172, 173, 174
Alfalfa.. .. ..173. 174, 175, 176, 177
Fungicides and insecticides, chemistry of.. 191
Gas-lime.. 191
Gillett's perfumed 100 per cent lye.. 191
Gluten meal.. 185
feed.. 185
Grass pea (*Lathyrus sativus*).. .. 138, 183

PAGE

CHEMIST, Report of the—*Con.*
Greenbank's soapmaker.. 191
Insecticides and fungicides.. .. ..138, 191
Babbitt's pure potash or lye.. .. 191
Chemistry of.. 191
Different brands of lye.. 191
Gas-lime.. 191
Greenbank's soapmaker.. 191
Gillett's perfumed 100 per cent lye 191
notes on insecticidal mixtures.... 192
sal soda, use of instead of lime in Paris green.. 192
soft soap and whale-oil soap, value of.. 192
washing soda, addition of to soft soap.. 192
Lathyrus sativus (grass pea).. .. ..138, 183
Letter of transmittal.. 137
Lime, use of sal soda instead of in Paris green mixture.. 192
wash and soft soap, mixture of.. 192
Limestone and marl.. 154
from Quebec.. 155
Lye, Babbitt's pure potash.. 191
Gillett's perfumed 100 per cent.. 191
Greenbank's soapmaker.. 191
or washing soda, addition of to soft soap solution.. 192
Marl, from British Columbia.. 154
from Nova Scotia.. 155
and limestone.. 154
Meal, gluten.. 185
calf—Bibby's cream equivalent .. 188
Muck from Ontario.. 153
from Prince Edward Island.... .. 153
and muds.. 152
Mud, from Nova Scotia.. 153
Paris green mixture, use of sal soda instead of lime in.. 192
Pork, soft, investigation.. 138
Potato starch, Canadian.. 189
Relation of 'cover' crops and cultivation to soil moisture.. 149
Rice feed.. 187
Rock potash.. 191
weed, composition of.. 158
Roots, analysis of.. 161
changes in composition of during storage.. 163
composition of during storage..... 165
dry matter in during storage.. .. 164
nitrogen in dry matter in.. 164
ratio of albuminoid to non-albuminoid nitrogen in.. 166
total nitrogen in.. 164
Sal soda, use of instead of lime in Paris green mixture.. 192
Samples received for analysis.. 139
Sea-weed.. 158
Soft pork investigation.. 138
Soft soap and lime-wash, mixture of solution, addition of washing soda or lye to.. 192
and whale-oil soap, relative value of.. 192
Soils, examined for deficiency in lime 158
from British Columbia 137, 140, 148
" Ontario.. .. ..137, 141
" Nova Scotia.. .. ..137, 142
" North-west Territories.. .. 137
" Prince Edward Island.. ..137, 147
" Quebec.. .. ..137, 148
investigations 137, 140
moisture, relation of 'cover' crop and cultivation to.. 149

PAGE

CHEMIST—Report of the—*Con.*
Sugar beets, from Manitoba.. 163
from the North-west Territories 167
" Prince Edward Island.. 169
Tannery waste, analysis of.. 157
Thomas' phosphate flour (basic slag) 155
Washing soda or lye, addition of to soft soap solution.. 192
Waters from farm homesteads.. 193
Whale-oil soap and soft soap, relative value of.. 192
Wood-ashes.. 156
Zostera marina (Eel grass) 159

DIRECTOR—Report of the.. 5
Acknowledgments.. 85
Agriculture, experimental, in Canada.. 13
Barley, experiments with.. 11
six-rowed, select list of.. 13
six-rowed, test of varieties of.... 13
Albert.. .. ..13, 14
Argyle.. .. ..13, 14
Baxter.. .. ..13, 14
Beardless Salzer's.. 13
Blue Short Head.. 13
Blue Long Head.. .. ..13, 14
Brome.. .. ..13, 14
Champion.... 14
Chinese Hulless.. 13
Claude.. .. .. 13, 14
Common.. .. ..13, 14
Empire.... .. ..13, 14
Excelsior.. 13
Garfield.. .. ..13, 14
Hordeum Chousk.. 13
Hulless Black.. 13
Hulless White.. 13
Lytton.. 13
Mansfield.. 14
Mensury.. .. ..13, 14, 20
Munro.. 13
No. 8, from Norway.. 13
Nugent.. .. ..13, 14
Oderbruch.... .. ..13, 14
Princess Sialof.. 13
Odessa.. .. ..13, 14
Parkin.. 13
Petschora.. .. ..13, 14
Phœnix.. .. ..13, 14
Pioneer.. .. ..13, 14
Rennie's Improved.. .. .. ..13, 14
Royal.. .. ..13, 14
Salzer's Silver King.. 13
Sisolsk Spring.. 13
Stella.. .. ..13, 14
Success.. 13
Summit 13, 14
Trooper.. .. ..13, 14
Vanguard.. 13
Yale.. .. ..13, 14
two-rowed, select list of.. 12
two-rowed, test of varieties of.. 12
Beaver.. 12
Bestehorn's Kaiser.. .. .. ..11, 12
Bolton.. 12
Canadian Thorpe.. 12
Clifford.. 12
Danish Chevalier.. 12
Duckbill.. 12
Dunham.. 12
Fitchel Mountain.. .. ..11, 12
French Chevalier 12
Fulton.. 12
Gordon.. 12

PAGE

DIRECTOR—Report of the—*Con.*
Barley—two-rowed, test of varieties—*Con.*
Harvey.. 12
Invincible.. .. ..11, 12
Jarvis.. 12
Kinver Chevalier.. 12
Leslie.. 12
Logan.. 12
Monck.... 12
Nepean.. 12
Newton.. 12
Oregon.. .. ..11, 12
Pacer.. 12
Pelham.. 12
Plumage 11, 12
Prize Prolific.. 12
Rigid.. 12
Sydney.. 12
Standwell.. .. .. 11, 12
Thanet.. 12
Victor.. 12
Carrots, experiments with 29
test of varieties of.. 29
select list of.. 30
Clovers, experiments with.. 36
Clover, results of sowings of oats after.. 36
Clover, results of ploughing under, on potato crop.. 38
Clover, results of ploughing under, on corn crop.. 37
Corn, experiments with.. 24
select list of.. 25
Angel of Midnight.. .. .. ..24, 25
Black Mexican.. .. ..24, 25
Canada White Flint.. .. .. ..24, 25
Champion White Pearl.. .. ..24, 25
Cloud's Early Yellow.. .. ..24, 25
Compton's Early.. .. ..24, 25
Country Gentleman.. .. .. ..24, 25
Early August.. 24
Early Butler.. .. ..24, 25
Early Mastodon.. .. ..24, 25
Early Yellow Long-eared.. ..24, 25
Evergreen Sugar.. .. ..24, 25
Extra Early Huron.. .. .. ..24, 25
Extra Early Szekely..... ..24, 25
Giant Prolific Ensilage.. .. ..24, 25
Kendall's Giant.. .. ..24, 25
King of the Earliest.. .. .. ..24, 25
Longfellow.. .. ..24, 25
Mammoth Cuban.. .. ..24, 25
Mammoth Eight-rowed Flint..24, 25
Mitchell's Extra Early.. .. ..24, 25
North Dakota White.. .. ....24, 25
North Dakota Yellow.. 24
Pearce's Prolific.. .. ..24, 25
Pride of the North.. .. .. ..24, 25
Red Cob Ensilage.. .. ..24, 25
Rennie's B.B... 24
Rennie's Earliest Ontario 24
Rennie's Victoria.. 24
Rural Thoroughbred White Flint.. .. ..24, 25
Sanford.. .. .. 24, 25
Selected Leaming.. .. ..24, 25
Salzer's All Gold.. 24
Salzer's Earliest Ripe.. 24
Superior Fodder.. 24
White Cap Yellow Dent.. ..24, 25
Yellow Six Weeks.. .. ..24, 25
Corn, sown in rows at different distances.. 24
Correspondence.. 61

PAGE

DIRECTOR—Report of the—*Con.*
Crops, action of fertilizers on.. 40
Crops in the several provinces.. 6
Ellis, Wm., reports of.. .. ..53, 59
Experiments with fertilizers on barley 46
on Indian corn.. 50
on mangels and turnips.. 53
on oats.. 48
on wheat.. 44
Fall wheat, experiments with.. 14
Fertilizers, action of, on wheat, oats, clover and Brome grass.. 38
Fertilizers, special experiments with 40
Financial statement.. 559
Grain tests, table of, for each province.. 5
Green clover as a fertilizer.. 37
Glasgow Exhibition, agricultural and horticultural displays at.. 97
Grain sown in different quantities.. 19
Hay, W. H., report of.. 559
Horse beans, experiments with.. .. 34
Letter of transmittal.. 3
Mangels, experiments with.. 27
test of varieties of.. 28
select list of.. 28
Meteorological observations.. 60
Millets, experiments with.. 35
Mixed roots and vegetables, experiments with.. 35
Oats, experiments with.. 7
new cross-bred sorts 7
select list of.. 9
test of varieties of.. 8
grown after different crops.. 34
Abundance.. .. .. 8, 10
Abyssinia.. .. .. 9, 11
Aiken Black.. 8
American Beauty.. .. .. 8, 10
American Triumph.. .. .. 8, 10
Anderbecker.. 8
Atlantic.. 9
Australian 9
Banner 8, 10, 20
Bavarian.. .. .. 9, 10
Bayonet 9
Bestehorn's Abundance.. 8
Beseler.. 9
Black Beauty.. .. .. 8, 10
Black Mesdag.. .. .. 9, 11
Black No. 6 summer.. 9
Bonanza.. .. .. 9, 11
Brandon.. .. .. 9, 11
Buckbee's Illinois 8, 10
California Prolific Black.. .. .... 8, 10
Columbus.. .. .. 8, 10
Coulommiers.. .. .. 9, 10
Cream Egyptian.. .. .. 8, 11
Cromwell.. .. .. 8, 11
Danish Island.. .. .. 8, 10
Dixon.. 8
Doncaster Prize.. .. .. 8, 10
Duppauer Summer 9
Early Archangel.. .. .. 9, 10
Early Blossom.. .. .. 8, 10
Early Dawson.. .. .. 8, 10
Early Etampes.. 10
Early Golden Prolific.. .. .. 9, 10
Early Gothland.. .. .. 8, 10
Early Maine.. .. .. 8, 10
Eureka.. 8
Flying Scotchman.. .. .. 9, 11
Forbes.. 9
Golden Beauty.. .. .. 8, 10

PAGE

DIRECTOR—Report of the—*Con.*
Oats—Experiments with—*Con.*
Goldfinder.. 9
Golden Giant.. .. .. 9, 10
Golden Tartarian.. .. .. 9, 10
Great Northern.. 9
Hazlett's Seizure.. .. .. 8, 10
Holland.. .. .. 8, 10
Holstein Prolific.. .. .. 8, 10
Imported Irish.. .. .. 9, 10
Improved American.. .. .. 8, 10
Improved Ligowo.. .. .. 8, 10
Irish Victor.. 8
Joanette.. .. .. 8, 11
Kendal.. .. .. 8, 9, 10
King 8, 10, 11
Leutewitzer 8
Liberty.. 8
Lincoln.. .. .. 8, 10
Longhoughton.. 9
Master.. .. .. 8, 11
Medal.. .. .. 9, 10
Mennonite.. .. .. 8, 10
Milford 8, 11
Miller.. .. .. 9, 11
Mortgage Lifter.. .. .. 9, 10
Newmarket.. .. .. 8, 11
New Zealand.. .. .. 8, 19
Oderbruch.. .. .. 8, 10
Olive.. .. .. 8, 10
Oxford 8, 11
Pense.. .. .. 8, 11
Pioneer.. 9
Poland.. .. .. 8, 10
Prize Cluster 10
Probstey.. 9
Prolific Black Tartarian.. .. .... 8, 11
Rennie's Prize.... .. .. 8, 10
Rosedale.. .. .. 8, 11
Russell.. .. .. 8, 9, 11
Salines.. .. .. 9, 10
Salzer's Big Four.. 8
Sargent Free.. 9
Scotch Hopetoun.. 10
Scotch Potato.. 9
Scottish Chief.. 9
Selchower.. 8
Sensation.. 8
Siberian.. .. .. 9, 10
Swedish Select.. .. ..
Tartar King.. 9
Thousand Dollar.. .. .. 8, 10
Tobolsk 2800.. 8
Uberfluss.. 8
Victoria Prize.. 8
Virginia White Abundance.. 8
Wallis.. .. .. 9, 10
Waverley.. 9
Welcome.. .. .. 9, 10
White Giant.. .. .. 8, 10
White Monarch.. 10
White Russian.. .. .. 9, 10
White Schonen.. .. .. 8, 10
White Wonder.. .. .. 9, 10
Wide-Awake.. .. .. 8, 10
Winter Grey.. .. .. 9, 10
Zhelanni.. 9
Pan-American Exhibition, display at 79
Pease, experiments with.. 21
Pease, select list of.. 23
Potatoes, field plots of.. 32
select list of.. 33
Previous crops, influence of.... 34
Pyrus baccata, crosses of.. 6

PAGE

DIRECTOR—Report of the—*Con.*
Reports on journeys made.. 80
Sable Island, experiments in tree planting on.. 62
Seed grain, distribution of.. .. .. ..6, 55
new feature in distribution of.. 56
Seeds, tests of vitality of.. 58
Siberian crab, crosses of.. 6
Soja beans, experiments with.. 34
Summary of stock, &c., on each Experimental Farm.. 562
Sugar beets, experiments with.. 30
test of varieties of.. 31
Sugar beets select list of.. 31
Turnips, experiments with.. 26
Select list of.. 27
test of varieties of.. 26
yield of, from late pulling.. 27
Visit to Eperimental Farm, Nappan, N.S... 80
Visit to Experimental Farm, Brandon, Man... 80
Visit to Experimental Farm, Indian Head, N.W.T.. 80
Visit to Experimental Farm, Agassiz, B.C... 85
Visit to Regina and Pense, N.W.T.. .. 82
Visit to Southern Alberta.. 82
Wheat, winter, experiments with.. .. 14
Wheat, spring, experiments with.. .. 15
Wheat, spring, select list of.. 18
Admiral.... .... 16, 19
Advance.... .... 17, 19
Alpha.... 17
Angus.... 17
Beaudry.... .... 16, 19
Beauty.. .. .. 16, 19
Benton.... 17
Bishop.... 17
Black Sea.... 17
Blair.... .... 17, 19
Blenheim.... .... 16, 19
Boyle.... 16
Bryon.... .... 17, 19
Captor.... .... 16, 19
Cartier.... 16
Cassel.... 17
Chester.... 16
Clyde.... .... 16, 19
Colorado.... .... 16, 19
Connell, White.... .... 16, 19
Countess.... .... 17, 19
Crawford.... .... 17, 19
Crown.... .... 16, 19
Dawn.... .... 16, 19
Dawson.... 17
Dayton.... .... 16, 18
Dion's.... .... 16, 19
Dufferin.. .. .. 17, 19
Early Riga.... .... 16, 19
Ebert.... .... 17, 19
Emporium.... 16
Essex.... 17
Felbrig, No. 7.... 17
Fife, Red.... .... 16, 19
Fife, White.... .... 16, 19
Fife, Wellman's.... .... 16, 19
Florence.... 17
Fraser.... .... 17, 19
Gehun.. 17
Goose.... .... 16, 19
Grant.... .... 16, 18
Harold.... .... 17, 19
Hastings.... 16
Herisson Bearded.... .... 16, 19

PAGE

DIRECTOR—Report of the—*Con.*
Wheat, spring, select list of—*Con.*
Hungarian.... .... 16, 19
Huron.... .... 16, 19
Japanese.... 17
Kingsford.... .... 16, 18
Kerr Gifford.. 17
Ladoga.... .... 17, 19
Lakefield.... .... 16, 18
Laurel.... .... 16, 19
Leutewitzer.... 17
Mason.... .... 17, 19
Minnesota, No. 149.... 17
Minnesota, No. 163.... 16
Minnesota, No. 169.... 16
Minnesota, No. 181.... 16
Morley.. .. ..16, 18
Monarch..... .... 17, 19
Newdale.. .. ..17, 18
Nixon.... .... 16, 18
Norval.... .... 17, 19
No. 1, Australian.... 16
No. 2, Australian.... 16
No. 9, Australian.... 17
No. 10, Australian.... 16
No 11, Australian.... 17
No. 12, Australian.... 16
No. 13, Australian, Duff.... 16
No. 14, Australian.... 17
No. 15, Australian.... 16
No. 18, Australian.... 17
No. 19, Australian.... 16
No. 21, Australian.. 16
No. 23, Australian.. 16
No. 25, Australian.. 17
No. 27, Australian.. 16
No. 28, Australian.. 17
No. 2959.... 16
No. 5639.... 16
No. 5643.... 17
No. 5644.... 16
No. 5645.... 16
No. 5646.... 16
No. 5682.... 16
No. 5699.... 17
Old Red River.. 16
Orleans.... .... 17, 18
Perron.... 16
Plumper.. .... 16, 19
Polonian..... 17
Preston.... .... 16, 19, 20
Prospect.... .... 16, 18
Percy.... 16
Powell.... .... 17, 19
Pringle's Champlain.... .... 16, 19
Progress.... .... 17, 19
Red Fern.... .... 16, 19
Red Swedish.... .... 17, 19
Redpath.... .... 17, 18
Rideau.... .... 16, 19
Rio Grande.... .... 16, 19
Robin's Rust Proof.. 17
Robson.... .... 17, 18
Roumanian.... .... 16, 19
Speltz.... 16
Spence.... .... 17, 18
Stanley.... .... 17, 19
Steinmedal.... 16
Strubes.... 17
Summer, No. 9.... 17
Tracey.... .... 16, 18
Vernon.... .... 17, 19
Weldon.... .... 17, 19
White Chaff, Campbell's.... .... 16, 19
White Russian.... .... 16, 19

PAGE

ENTOMOLOGIST & BOTANIST,—Report of..197, 262
Acknowledgments.... 199
Aleochara nitida.. 230
Amara, sp.... 227
Anasa tristis 231
Anderson, J. R., work by.... 206
Anisopteryx.. 239
Anthomyia, root maggots.. 230
Aphidius.. 213
Aphis brassicæ.. 229
Apiary.... 252
Experiments with different kinds of hives.. 253
in feeding syrup for winter stores 253
with foundations of different sizes 254
to test whether bees injure fruit. 254
Answers to correspondents.. 256
Wax Moth.. 256
shipping bees.. 257
moving bees in apiary.. 258
what to do with half full sections 258
Arrowsmith, Mount, collecting trip on 208
Asparagus Beetle.... 231
Rust.... 231
Aspen Poplar, attacked by Poplar Rust 259
Axyris amarantoides.... 203
Batho, Geo., on crops in the West.... 211
Bean Aphis, Black.... 212
Bedford, S. A., on Poplar Rust.. 261
Betula occidentalis.. 260
Birch attacked by Poplar Rust.... 260
Birch Skeletonizer.... 251
'Bishop Bug'.... 231
Blackberry, soft-scale.... 241
Biastothrix, sp.. 241
Blister Beetle, Black.... .... 227, 233
Striped.. 233
Borer, Shot-hole.. 249
Borers, Apple-tree.... 240
Brome, Awnless.... .. .. .. 198, 203, 204, 205
sowing and eradicating.... 203
when to cut for seed.... 204
success in the West.... 261
Bromus inermis.... .... 205, 261
Pumpellianus.. 205
Bucculatrix canadensiscila.... 251
Butterflies captured on Mt. Ché-am.. 210
Cabbage Worms.... 229
Cœoma laricis.... 260
pinitorquum.... 260
Camnula pellucida.... .... 222, 227
Cankerworms.... 239
remedies.... 239
Carneades ochrogaster.... .. 217, 213, 220, 222
Carpocapsa pomonella.. 238
Cecidomyia destructor.. 214
Cecidoptes pruni.... 241
Cereals, insect enemies of.. 211
Ché-am, Mount, collecting trip on.... 209
Chrysobothris femorata.. 240
Click Beetles.. 241
Clisiocampa.. 240
Coccophagus flavoscutellum.. 241
Codling Moth.. 238
Colaspis brunnea.. 249
Collections, entomological and botanical.. 198
Conifers, new enemy of.. 251
Cordyceps, sp.. 241
Correspondence.. 197
Corymbites caricinus.. 241
cylindriformis.. 241
tarsalis.. 241
Cottonwoods, attacked by Poplar Rust. 260
Criddle, N., on grasshoppers.. 225
Crioceris asparagi.. 231

PAGE

ENTOMOLOGIST & BOTANIST—Report of—*Con.*
Cucumber Beetle, Striped.. 232
Flea-beetle.. 234
Currant Borer, Imported.. 238
Maggot.. 238
Cutworm, Glassy.. 217
Red-backed.. .. .. 217, 220, 222
Variable.. 236
Variegated.. 229
Cutworms in grain.. 217
in gardens.. 230
Diabrotica vittata.. 232
Elaterida.. 241
Empusa grylli.. 226
Epicauta Pennsylvanica.. .. ..227, 233
vittata.. 233
Epitrix cucumeris.. 234
Epochra canadensis.. 236
Erebia vidleri.. 210
Eucoila anthomyiæ.. 231
Eupsephopæetes procinctus.. 230
Eutochus xanthothorax.. 241
Exoascus deformans.. 246
Farmers' Institutes in British Columbia.. 206
Fisher, Geo. E., work by.. 245
on mixtures for cankerworms.. .. 239
on Canada crude petroleum.. 248
on hydrocyanic acid fumigation.... 248
Fixter, John, report by.. 252
Fodder plants.. 261
insect enemies of.. 198
Forest trees, insect enemies of.. 251
Fruit Bark-beetle.... 249
Fruit crops, insect enemies of.. 237
Fumigation for San José Scale.. .. 244, 248
Fusarium, sp.. 259
Galleria mellonella.. 256
Galloway, Prof. B. T., on Maple Seed Blight.. 259
Gomphocerus sp.. 227
Grape-vine Colaspis.. 249
Grasshoppers.. 220
Grain Aphis.. 212
parasites of.. 213
Grain, cutworms in.. 217
Grass experiments.. 198
Grass Pea.. 212
Grasses, fodder.. .. .. 198, 261
in the West.. .. ..201, 261
Gregson, F. B., work by.. .. .. 202, 203, 205
Hadena devastatrix.. 217
Hawkmoth, Five-spotted.. 234
Hessian Fly.. 214
parasites.. 216
remedies.. 217
Hierochloa borealis.. 204
Hippodamia 13-punctata.. 213
Hovering flies.. 213
Hydrocyanic acid fumigation.. 248
Hyperaspis proba.. 241
signata.. 241
Jones, Dashwood, on *P. saucia*.. 229
Ladybird, Thirteen-spotted.. 213
Ladybird beetles, preying on grain.... 213
Aphis.. 213
preying on *Lecanium*.. 241
Lathyrus maritimus.. 212
sativus.. 212
Lecanium Fitchii.. 241
Lecturing tours and investigations in the West.. 201
British Columbia.. 206
Manitoba.. .. .. 201, 221
North-west Territories.. 201
Lime wash for Oyster-shell Bark-louse. 239

PAGE

ENTOMOLOGIST & BOTANIST—Report of—*Con.*
Lochhead, Prof. W., on Hessian Fly. 214, 216
on Squash Bug.. 231
on Tomato Sphinx.. 234
on Potato-stalk Weevil.. 234
Locust, Lesser Migratory.. 221-228
Packard's.. .. .. 223, 228
Pellucid.. .. .. 222, 223, 228
Rocky Mountain 222-225, 228
Two-striped.. .. ..222, 228
Locusts.. 220
Paris green mixture for.. .. 223, 226, 228
parasites of.. 227
Mackay, Angus, work by.. 202-205
on Awnless Brome.. .. .. 203, 204
on summer-fallowing.. 205
Macrodactylus subspinosus.. 340
Mamestra atlantica.. 236
neradæ.. 237
picta.. 231
subjuncta.. 237
Maple Seed Blight.. 259
McKellar, Hugh, on grasshoppers.. 220, 225
Meetings attended.. 197
Mclampsora betulina.. 260
populina.. 259
Melanoplus affinis.. .. .. 210, 228
atlanis.. .. .. 222, 224, 228
bivittatus.. .. .. 222, 227
Packardii.. .. .. 223, 227
spretus.. .. .. 222, 227
Meromyza Americana.. 214
Microterys.. 241
Mustard, Ball.. 203
Mytilaspis pomorum.. 239
ulmi.. 239
Nature Study.. 207
Nectarophora destructor.. 212
Negundo accroides.. 259
Neslia paniculata.. 203
Otiorrhynchus sulcatus.. 238
Oyster-shell Bark-louse.. 239
Paris green mixture for grasshoppers.. .. ..223, 226, 228
preparation of.. 226
dry application.. 232
in water, for cankerworm.. 239
for Grape-vine Colaspis.. 250
Patterson, Mrs. F. W., on Poplar Rust. 260
Pea, Beach.. 212
Pea, Grass.. 212
Pea Aphis, Destructive.. 212
Pea Moth.. 212
Pea Weevil.. 212
Peach Bark-beetle.. .. .. 242, 249
Peach Curl.. 246
Peridroma saucia.. 229
Peterson, C. W., on Awnless Brome.. 261
Petroleum, crude, for San José Scale.. 246
Phlœotribus liminaris.. .. .. 242, 249
Phlœothrips sp., on wheat.. 213
Picris rapæ.. 229
Pig-weed, Russian.. 203
Plants, alpine, Mt. Arrowsmith.. .. 208
Mt. Ché-am.. 209
Plum Gall-mite.. 241
Poplar Rust.. 259
Populus monilifera.. 260
tremuloides.. 259
Potato pests.. 232
Potato Beetle, Colorado.. 233
Potato-stalk Weevil.. 234
remedy.. 235
Praon sp... 213
Protoparce carolina.. 234
celeus.. 234

PAGE

ENTOMOLOGIST & BOTANIST—Report of—*Con.*
Puccinia asparagi.. 231
Pyrethrum Insect Powder.... 229
Resin mixtures, for cankerworms.. .. 239
Riley, Prof. C. V., quoted.. 250
Root crops and vegetables, insect enemies of.. 223
Root Maggots.. 230
Rose Chafer.. 240
Rubus nivalis.. 207
Rye-grass, Western.. .. ..198, 203, 205
Tent Caterpillars.. 240
Tomato Sphinx 234
Trichobaris trinotata.. 234
Turnip Aphis.. 229
San José Scale.. 242
injurious nature of.. 243
rapidity of increase.. 243
remedial measures taken... 244
remedies.. 245
Sandhills, reclaiming.. 198
Saperda candida.. 240
Scolytus rugulosus.. 249
Sears, Prof. F. C., on apple crop.... 238
Semasia nigricana.. 212
Semiophora youngii.. 251
Sesia tipuliformis.. 238
Shot-hole Borer.. 249
Siphonophora avenæ.. 212
Smith, Dr. J. B., on *Mamestra* moths 237
on crude petroleum.. 247
Squash Bug.. 231
remedies.. 231
Sweet Grass, as a weed.. 204
Wallis, J. C., on Hessian Fly.. 215
Wax Moth.. 256
Webster, Prof. F. M., on Hessian Fly 216
Weeds, lectures on.. .. ..201, 204
Whale-oil soap, for San José Scale.. 246
Wheat Midge.. 212
Wheat-stem Maggot.. 214
Xyleborus dispar.. 249
Zavitz, Prof. C. A., on Hessian Fly.. 216
Zebra Caterpillar.. 231

EXPERIMENTAL FARM, AGASSIZ—Report of Superintendent.. 513
Almonds.. 550
Apples, report on, with descriptions of new varieties fruiting.. 538
Apricots, report on.. 549
Barley, experiments with.. 518
test of varieties of.. 519
grown from screened seed 519
using different quantities of seed. 520
Beans, experiments with 535
Bees, report on 515
Beets, experiments with.. 535
Blackberries, report on 556
Agawam 556
Brunton 556
Early Cluster 556
Early Harvest 556
Early King 556
Eldorado 556
Erie 556
Hansel 556
Kittatinny 556
Lawton 556
Maxwell 556
Minnewaska 556
Ohmer.. 556
Oregon Everbearing 556
Stone's Hardy 556

PAGE

EXPERIMENTAL FARM, AGASSIZ—*Con.*
Blackberries—Report on—*Con.*
Snyder .. 556
Taylor's Prolific .. 556
Tecumseh .. 556
Wilson's Early .. 556
Wilson, Jr.. 556
Breaking and clearing .. 515
Brocoli, experiments with .. 535
Brussels Sprouts, experiments with.. 534
Cabbage, experiments with.. 534
Carrots, experiments with.. ....528, 534
test of varieties of.. .. 529
Cattle .. 515
Cauliflowers, experiments with.. 534
Celery, experiments with .. 536
Cherries, report on, with descriptions of new varieties fruiting .. 548
Clearing of land .. 515
Corn, experiments with 525, 536
Corn, planted at different distances.. 526
Currants, black, report on.. 552
Ambrafarbige .. 552
Baldwin .. 553
Bang up .. 552
Beauty .. 552
Bella .. 553
Black Naples .. 553
Climax .. 553
Dominion .. 552
Eagle .. 552
Ethel .. 553
Gewohnliche .. 552
Henry .. 553
Kentish Hero .. 552
Kentville .. 553
Lanark .. 552
Lee's Prolific .. 553
Lennox .. 552
Lewis.. 553
London .. 552
Manitoba Wild .. 553
Middlesex .. 552
Monarch .. 553
Norton .. 553
Ogden's Black .. 553
Ontario .. 553
Oxford .. 553
Parker .. 552
Pearce .. 552
Pomona .. 553
Prince of Wales .. 553
Ruler .. 552
Star .. 552
Stirling .. 552
Stewart.. 552
Success .. 552
Victoria .. 552
Wood .. 552
Currants, red and white, report on.... 552
Beauty of St. Giles .. 552
Champaigner, white .. 552
Chenonceau .. 551
English Red.. 552
Eyatt's new.. 551
Fay's Prolific .. 551
Frauendorfer .. 551
Gondoin, red .. 551
Knight's Early .. 551
La Conde .. 551
La Fertile .. 551
La Hative .. 551
La Turiuese .. 551
Large Red.. 551

PAGE

EXPERIMENTAL FARM, AGASSIZ—*Con.*
Currants—Red and White—*Con.*
Large White Brandenburg.. 551
Large White Dessert.. .. 551
London Red .. 551
Moore's Ruby .. 551
New Red Dutch.... .. 551
North Star .. 551
Prince Albert .. 551
Raby Castle .. 552
Red Cherry .. 551
Red Dutch .. 551
Ringen's Red .. 551
Verrier's White .. 551
Versailles 551
Victoria .. 551
White Cherry.... .. 552
" Dutch .. 552
" Esperen.. .. 551
" Grape .. 551
" Imperial .. 551
" Pearl .. 551
" Transparent .. 552
Distribution of seed grain, potatoes, &c.. .. 537
Ditching .. 514
Fodder crops, experiments with 531
Forest trees, plantations of 514
Fruit crops .. 514
Grapes, report on .. 550
Hedges.. .. 514
Horse beans, experiments with 532
Indian corn, experiments with.. 527
test of varieties of 526
sown different distances apart .. 526
Lettuce, experiments with 534
Live stock .. 515
Mangels, experiments with 527
test of varieties 528
Medlars, report on .. 550
Meteorological report 538
Millets, experiments with 532
Mixed grain, experiments with 533
Nectarines, report on 549
Nut-bearing trees, report on 514
Oats, experiments with 516
test of varieties of 517
using different quantities of seed.. 518
treated with fertilizers 524
Onions, experiments with.. 536
Ornamental trees and shrubs 514
Paspalum dilatatum.. 533
Peaches, report on .. 549
Pears, report on, with descriptions of new varieties fruiting 546
Pease, garden, experiments with 536
Pease, field experiments with.. 522
test of varieties 523
tests with fertilizers 524
Pigs .. 515
Plums, report on, with descriptions of new varieties fruiting 547
Potatoes, experiments with 530
test of varieties of 530
tests with fertilizers 525
Poultry .. 515
Pumpkins, experiments with.... 537
Quinces, report on .. 550
Radishes, experiments with.. 535
Rape, Dwarf Essex .. 533
Raspberries, black cap, report on .. 555
Ada.. .. 555
American Yellow Cap.. 555
Conrath.. 555

PAGE

EXPERIMENTAL FARM, AGASSIZ—*Con.*
Raspberries—Black Cap—*Con.*
Cromwell.. 555
Early Ohio.. 555
Gregg.. 555
Hopkins.. 555
Jackson's May King.. 555
Kansas.. 555
Lovett.. 555
Nemaha.. 555
Older.. 555
Palmer.. 555
Progress.. 555
Smith's Prolific.. 555
Raspberries, red and yellow, report on 553
All Summer.. 554
Arnold's Hybrid.. 553
Autumn Surprise.. 554
Barnett.. 555
Battler's Giant.. 553
Baumforth's Seedling.. 554
Beehive.. 554
Belle de Fontenay.. 553
Brinckle's Orange.. 554
Cariboo Wild.. 554
Carleton.. 555
Carter's Prolific.. 553
Champion.. 553
Chili.. 554
Clarke.. 555
Col. Wilder.. 555
Craig.. 554
Crimson Beauty.. 553
Cuthbert.. 555
Duke of Brabant.. 554
Empire.. 555
Fastollf.. 555
Franconia.. 555
French Vice-President.. 554
Garfield.. 554
Garnet.. 554
Golden Queen.. 554
Goliath.. 555
Guinea.. 554
Hansel.. 553
Heebner.. 555
Hornet.. 555
Knevit's Giant.. 554
Lady Anne.. 554
Large Yellow.. 554
La Mercier.. 554
Lizzie.. 555
Lord Beaconsfield.. 554
Malta.. 554
Marlboro.. 553
Mary.. 554
Miller.. 555
Muriel.. 554
Muskingum.. 554
New Fastollf.. 553
Nonpareil.. 555
Northumberland Fillbasket.. 553
Oregon Late.. 555
Paragon.. 553
Pauline.. 555
Percy.. 554
Phœnix.. 553
Prince of Wales.. 555
Queen of the Market.. 554
Queen Victoria.. 555
R. B. Whyte.. 554
Red Herrenhauser.. 554
Sarah.. 554
Shaffer's Colossal.. 554

PAGE

EXPERIMENTAL FARM, AGASSIZ—*Con.*
Rasperries—Red and Yellow—*Con.*
Sharpe.. 554
Sir John.. 555
Sugar of Metz.. 553
Thompson.. 553
Turner.. 554
Wilder.. 554
Sand Vetch.. 533
Sheep.. 515
Small Fruits.. 550
Soja Beans, experiments with.. 532
Squash, experiments with.. 537
Strawberries, report on.. 556
Alexander II.. 556
Alpha.. 556
Anna Kennedy.. 556
Arkansas Traveller.. 557
Arrow.. 556
Bissel.. 556
Bonnie Lass.. 556
Brandywine.. 556
British Queen.. 557
Chairs.. 556
Crockett's Choice.. 557
Devereau.. 557
Dr. Hogg.. 557
Dayton.. 556
Eclipse.. 557
Eleanor.. 556
Empress Eugenie.. 557
Enchantress.. 557
Greenville.. 557
H. W. Becher.. 557
Imp. Jucunda.. 557
Imperial Newman.. 557
Improved Westbrook.. 557
Iowa Beauty.. 556
Kansas Prolific.. 557
Laxford Hall.. 557
Laxton's Noble.. 557
Mary.. 557
Magoon.. 557
Maxwell.. 557
Michigan.. 557
Omega.. 556
Sir Joseph Paxton.. 557
Tennessee Prolific.. 557
Timbrell.. 556
Van Deman.. 556
Warfield.. 557
Weston.. 557
White Alpine.. 557
Windsor Chief.. 557
Sugar beets, experiments with.. 529
test of varieties of.. 529
Sunflowers, experiments with.. 553
Turnips, experiments with.. 527
test of varieties of.. 527
Turnips, table, experiments with.. 535
Vegetable garden.. 533
Weather.. 513
Wheat, spring, experiments with.. 520
test of varieties of.. 521
Wheat grown from screened seed.. 522
Wheat, using different quantities of seed.. 522

EXPERIMENTAL FARM, BRANDON,—Report of the Superintendent.. 395
Apples, grafted.. 431
Apples, report on.. 430
Apples, standard.. 431
Apples, cross-bred, report on.. 430

PAGE

EXPERIMENTAL FARM, BRANDON—*Con.*

Arboretum.. 438
Asparagus.. 448
Avenues.. 441
Awnless Brome grass.. 426
Barley, experiments with.. 407
average results of a five years' test 409
test of varieties of.. 408
field plots of.. 409
preventives of smut in.. 409
selected and unselected seeds.. .. 402
Beans, experiments with.. 447
Bees, experiments with.. 428
Beets, experiments with.. 446
Breaking, new.. 453
Bromus inermis.. 426
Buckwheat, a volunteer crop.. 412
Cabbage, experiments with.. 443
Carrots, experiments with.. .. .. 416, 446
test of varieties of.. 417
Cattle, report on.. 421
feeding of.. 422
experiments in dehorning.. 422
Cauliflower.. 444
Cherries, report on.. 435
Citrons.. 448
Clovers.. 420
Corn, Indian, experiments with....412, 448
test of varieties of.. 413
sown at different distances apart.. 414
Correspondence.. 455
Cows, milking.. .. ..422, 427
Crab-apple trees, report on.. 430
Crabs, wild, of Siberia.. 430
Cucumbers, experiments with.. 445
Currants, report on.. 435
Distribution of seed grain and potatoes.. 452
of forest tree seeds.. 452
Exhibition samples.. 453
Farmers' meetings of, attended.. 454
Flax, experiments with.. 412
Field roots, experiments with.. 414
Flowers, experiments with.. 449
Fodder corn, experiments with.. 412
Flowering shrubs, report on.. .. ..439, 442
Fruit trees, experiments with.. 430
Grasses.. 420
Hedges, report on.. 440
Horticulture 429
Lettuce.. 442
Mangels, experiments with.. 415
test of varieties of.. 416
Meetings attended.... 454
Meteorological report.. 454
Millets, experiments with.. 421
Mixed pease and oats.. 411
Oats, experiments with.. 405
average results of a five years' test 407
field plots of.. 407
test of varieties of.. 406
Onions, experiments with.. 442
Parsley.. 443
Parsnips, experiments with.. 448
Pease, field, experiments with.. 409
test of varieties of.. 410
average results of a five years' test 411
thick and thin sowing of.. 411
garden.. 444
Perennial flowers.. 451
Plum trees, report on.. 432
Poplars and willows, distribution of.. 452
Potatoes, experiments with.. 417
test of varieties of.. 418
average yield during five years.. 420

PAGE

EXPERIMENTAL FARM, BRANDON—*Con.*

Poultry, report on.. 427
Pumpkins.. 445
Pyrus baccata.. 430
Radish.. 444
Raspberries, report on.. 435
Rhubarb, experiments with.. 436
Rotation of crops.. 404
Salsify.. 447
Samples for exhibition purposes.. .. 453
Sand cherries, report on.. 435
Shrubs and trees, new.. 442
Spinach.. 448
Squash.. 445
Steers, experiments with.. 422
Steers, Speltz as food for.. 424
Sugar beets, experiments with... .. 417
Sunflowers.. 421
Sweet Herbs.. 446
Swine, experiments with.. 427
Tomatoes.. 447
Tree distribution.. 452
reports on.. 452
Tulips.. 451
Turnips, experiments with 414, 447
test of varieties of.. 415
Vegetable garden.. 442
Weather.. 395
Wheat, Speltz, experiments with.. .. 402
Wheat, Speltz, thick and thin sowing 403
spring, experiments with.. 395
different methods of preparing land for.. 400
field plots of.. 398
test of fertilizers on.. 400
selected and unselected seed.. .. 400
test of varieties of.. 396
results of five years' test of.. .. 398
thin and thick sowing of.. 398
and flax mixed.. 399
and rape mixed.. 399

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—Report of the Superintendent.. 457
Alfalfa Turkestan, experiments with 475
Agropyrum tenerum.. .. ..475, 476
Apples, report on.. 499
Arboretum.. 494
Asparagus, experiments with.. 482
Awnless Brome grass.. .. ..475, 476
Barley, crop and average yield.. 469
test of varieties of.. 466
experiments with.. 466
field lots of.. 467
test of preventives for smut in.. 468
Beans, garden, experiments with.. .. 483
Beets, experiments with.. 483
Breaking and backsetting.. 506
Brocoli.. 483
Bromus inermis.. .. ..475, 476
Brussels sprouts.. 483
Cabbage, experiments with.. 484
Canary Seed, grass.. 474
Carrots, test of varieties.. .. .. ..479, 484
Cattle 507
Cauliflower, experiments with.. 485
Celery, experiments with.. 485
Cherries, report on 504
Citrons, experiments with.. 488
Corn, Indian, experiments with.. 470
sown at different distances.. 471
test of varieties of.. 471
Corn, garden.. 484
Correspondence.. 512

PAGE

EXPERIMENTAL FARM, INDIAN HEAD—*Con.*

Crab apples, Siberian.. 499
Crops on Experimental Farm.. 458
Cross-bred apples.. 501
Cucumbers, experiments with.. 485
Currants, report on.. 504
Distribution of grain, potatoes, forest trees, &c.. 511
Farmers, meetings of, attended.. 510
Flax, experiments with.. 473
Flax, white, experiments with.. 473
Flowers, report on.. 489
Forest trees and shrubs, report on.. .. distribution of.. 512
Fruit trees and bushes, report on.... 499
Grain, distribution of samples of 511
Gooseberries, report on.. 504
Grasses, experiments with.. 476
Hay crop.. 475
Hedges.. 499
Herbs.. 489
Horse beans.. 475
Horses.. 510
Lettuce, experiments with.. 486
Mangels, experiments with.. 478
Marrows and Squash.. 487
Meetings attended.. 510
Melons, experiments with.. 486
Meteorological report.. 512
Millets, experiments with.. 473
Oat crop and average yield.. 468
Oats, experiments with.. 463
field lots of.. 465
test of varieties of.. 464
test of preventives for smut in.... 465
Onions, experiments with.. 486
Parsley.. 489
Parsnips, experiments with.. 488
Pease, experiments with.. 469
garden.. 487
test of varieties of.. 469
Peppers, experiment with.. 488
Perennial Flowers, report on.. 491
Plum trees, report on.. 502
Potatoes, experiments with.. 480
distribution of.. 512
test of varieties of.. 481
Poultry, report on.. 510
Pumpkins, experiments with.. 488
Radish, experiments with.. 488
Rainfall.. 512
Rape, experiments with.. 474
Raspberries, report on.. 504
Rhubarb, experiments with 489
Roots, field, experiments with.. 477
Rotation of crops, experiments in.... 472
Rye, spring.. 474
Rye grass, western.. 476
Sage.. 489
Seed grain, distribution of.. 510
Small Fruits.. 504
Smut in barley, tests for prevention of 468
in wheat, tests for prevention of. 461
Soja Beans.. 475
Steers, experiments with dehorning of. 507
Strawberries, report on.. 505
Sunflowers, experiments with.. 474
Sugar beets, experiments with.. 480
Summer fallows.. 505
Swine, report on.. 510
Tobacco, experiments with.. 489
Tomatoes, experiments with.. 488
Trees and shrubs.. 493
Turnips, experiments with.. .. ..477, 487

PAGE

EXPERIMENTAL FARM, INDIAN HEAD—*Con.*

Vegetable garden.. 482
Weather.. 457
Wheat, fall.. 463
Wheat, Speltz, experiment with.. 462
Wheat crop and average yield.. 468
Wheat, spring, experiments with.. .. 458
field lots of.. 460
test of varieties of.. 459
test of bluestone as a smut preventive for.. 461
test of fertilizers for.. 462
test of sowing selected and screened seed.. 461

EXPERIMENTAL FARM, NAPPAN, N.S.,—

Report of the Superintendent.. 335
Acknowledgments.. 335
Barley, experiments with.. 338
test of varieties of.. 339
Bees, experiments with.. 367
Buckwheat, field crop of.. 344
Buckwheat, experiments with.. 343
Carrots, experiments with.. 348
test of varieties.. 349
Cattle.. 357
Corn, Indian, experiments with.. .. 344
field crops of.. 354
planted at different distances 345
test of varieties.. 345
Correspondence.. 356
Cows, experiments with.... 358
Dairy cattle.. 357
Distribution of seed grain and potatoes 356
Exhibitions attended.. 356
Experiments with field grain.. 343
Fertilizers, experiments with.. 353
Hay.. 356
Horse beans, experiments with.. 352
Horses.. 357
Live stock.. 357
Mangels, experiments with.. 347
field crops of.. 355
test of varieties.. 348
Meetings attended.. 356
Meteorological report.. 336
Milch Cows, experiments with.. 358
Millets, experiments with.. 352
Mixed grain field crops.. 344
Oats, experiments with.. 337
field crops of, on marsh.. 343
test of varieties of.. 337
Pease, experiments with.. 341
test of varieties.. 342
Potatoes, experiments with.. 350
test of varieties of.. 350
Poultry.. 367
Seed grain and potatoes distributed.. 356
Sheep.. 367
Soja beans, early, experiments with.. 352
Steers, experiments in dehorning 360
on medium and heavy feeding.. .. 363
Sugar beets, experiments with.. 349
test of varieties.. 349
Swine, experiments with.. 366
Turnips, experiments with.. 346
field crops of 354
test of varieties.. 347
Visitors.. 335
Weather.. 335
Wheat, spring, experiments with.. .. 340
test of varieties.. 341
experiments with fertilizers.. .. 353

PAGE

EXPERIMENTAL FARM, NAPPAN—*Con.*
Report of the Horticulturist.. 369
Apple crop.. 369
Beans, garden, test of.. 382
Beans, fertilized and not fertilized.. 383
Beets, test of.. 390
Cabbage, test of varieties.. 385
Cauliflowers, test of varieties of.. .. 386
Cherries.. 370
Corn, test of varieties.. 389
with suckers removed and not removed.. 389
Currants, Red and White.. 378
Cucumbers, Squash and Pumpkins.... 391
Flower garden.. 370
Fruit crops.. 369
Gooseberries.. 377
Grapes.. 378
Meetings attended.. 393
Onions, test of.. 384
Ornamental trees and shrubs 370
Oyster-shell bark louse, treatment for 379
Parsnips, test of.. 390
Pears.. 370
Pease, garden, test of varieties.. 381
Plum crop.. 370
Potatoes, early, experiments with 391
Rhubarb.. 378
Shrubs and trees.. 370
Spinach.. 391
Strawberries, experiments with.. 375
Ada.. 376
Bissel.. 376
Brandywine.. 376
Bubach.. 376
Captain Jack.. 376
Chairs.. 376
Cossett 376
Crescent.. 376
Enhance.. 376
Equinox.. 376
Eureka.. 376
Gandy.. 376
Greenville.. 376
Haverland.. 376
H. W. Becher.. 376
Jas. Vick.. 376
Jessie.. 376
John Little.. 376
Leader.. 376
Lovett.. 376
Mary 376
Otsego.. 376
1001.. 376
Paris King.. 376
Parker Earle.. 376
Pearl.... 376
Princess.. 376
Saunders.. 376
Seneca Queen.. 376
Sharpless 376
Shirts.. 376
Swindle.. 376
Tenessee Prolific.. 376
Thompson's Late.. 376
Wilson.. 376
Wm. Belt.. 376
Warfield No. 2.. 376
Williams.. 376
Woolverton.. 376
Water melons.. 390
Tomatoes, test of varieties of.. 387
Weather.. 369

PAGE

Fletcher, Dr. J., Entomologist and Botanist—Report of.. 197

Gilbert, A. G., Poultry Manager—Report of.. 313

Grisdale, J. H., Agriculturist—Report of.. 263

HORTICULTURIST—Report of the.. 87
Acknowledgments.. 90
Apples.. 91
description of varieties of 93, 95
Aikin Red.. 95
Babbit.. 95
Baraboo.. 95
Boiken.. 95
Downing's Winter Maiden's Blush 95
Duffey's Seedling.. 95
Early Joe.. 96
Edgehill.. 96
Fameuse Suere.. 96
Hamilton.. 96
Horn.. 96
Jefferis.. 96
Kinnaird.. 96
Milding.. 97
Missouri Pippin.. 97
Norman.. 94
Okabena.. 97
Palouse.. 97
Parlin's Beauty.. 97
Patten's Duchess.. 98
Patten's Greening.. 98
Rochelle.. 97
Rufus.. 94
Switzer.. 98
Utter's Red.. 98
Winter Banana.. 98
Apples, seedling.. 93
Apple, orchard, seedling.. 92
Apple Spot fungus.. 109
Arboretum.. 131
Asparagus rust.. 110
description of.. 110
treatment for.. 111
Blight and rot of potatoes, results of.. spraying to prevent.. 119
Botanic Garden.. 131
Character of Season.. 87
Cherries.. 102
Corn.. 123
test of varieties of.. 124
Donations.. 90
Forest belts.. 127
additions to.. 131
growth of trees in.. 129
Grapes.. 102
pruning and training of.. 103
varieties of, planted in 1900 and 1901.. 104
Lilacs.. 132
descriptions of species and varieties of.. 133
Lime mixture, effect of, on oyster-shell bark-louse.. 109
List of best vegetables for farmers.... 112
Meetings attended and places visited.. 89
Muskmelons.. 124
test of varieties of.. 125
Oyster-shell bark-louse, effect of lime mixture on.. 109
Pears.. 98
Pears seedling, description of.. 98

PAGE

HORTICULTURIST—Report of the—*Con.*
Pease.. 122
experiments for comparison of yields and quality of.. 122
test of varieties of.. 123
Plums.. 99
Americana and Nigra.. 99
canning Americana and Nigra.. 101
drying Americana and Nigra.. 101
prices obtained for Americana and Nigra.. 99, 100
seedling.. 102
Bouncer.. 102
Caro.. 102
Don.. 102
Plum Jelly, recipe for.. 101
preserves, recipes for.. 101
Potatoes.. 113
planting at different dates.. 118
planting at different depths.. 117
planting at different distances apart.. 117
results of spraying to prevent blight and rot of.. 119
test of varieties of.. 114
twelve best yielding varieties of.. 117
Progress of the work.. 88
Raspberries.. 104
test of varieties of.. 104
Seedling apples.. 93
descriptions of.. 93
Seedling apple orchard.. 92
plums.. 102
descriptions of.. 102
Spraying.. 109
Strawberries.. 105
test of varieties of.. 106
Tobacco.. 125
test of varieties of.. 126
Tomatoes.. 120
six best yielding wrinkled varieties of.. 122
six earliest varieties of.. 121
test of varieties of.. 121
twelve best yielding smooth varieties of.. 122
Vegetables, list of best for farmers.. 112
Work, progress of.. 88

Mackay, A., Superintendent Experimental Farm, Indian Head, N.W.T.—Report of.. 457

POULTRY MANAGER, 1901—Report of.. 313
Artificial incubation, some difficulties in early.. 315
farmers' difficulties in hatching.. 316
Breeds, flesh development of certain 323
Breeds, trial of.. 324
Breeding pens, made up.. 319
Chickens wanted by purchasing companies.. 326

PAGE

POULTRY MANAGER—Report of—*Con.*
Conclusions *re* Egg-preserving substances.. 333
Cost of rations.. 327
Composition of rations.. 326
Diseases of poultry.. 330
Different methods of preserving eggs 332
Did early hatched pullets moult ?.... 328
Eggs laid during year.. 332
Eggs, preservation of.. 332
Eggs laid from Dec., 1901, to June 30, 1902.. 331
Eggs set and chickens hatched.. 321
Experiments in different ways of fattening chickens.. 323
Early moulting, how to secure.. 329
Faverolles, salmon coloured.. 325
Flesh development of Buff Orpingtons 325
Fattening in crates, limited and unlimited.. 323
Good laying by 3 Buff Orpington pullets.. 328
Hens—rations for 110.. 327
Incubator-hatched chicks, progress of 322
Lice, how to exterminate.. 330
Manner of feeding farm rations.. 326
Moulting period, shortening the.. 329
New breeds on trial.. 324
Orpingtons, Buff.. 324
Orpingtons and White Wyandottes.. 325
Progress made by chickens fed in crates.. 323
Red mites, how to get rid of.. 330
Rations, the Farm.. 326
Reds, Rhode Island.. 325
progress of six R. I.. 326
Pullets, rations for 150.. 327
Some observations confirmed.. 315
Stock on hand in December.. 331
Shutt, F. T., preservation of eggs by 332
Work of last winter, and results.. 314
What past experience has taught.. 314
Wanted, a three months' old chicken 326
Wyandottes and Orpingtons, flesh development of.. 325
Weight development of the chickens 322
Winter eggs, or, broilers ?.. 314
Weights of three months' old chicks 326
When pullets began to lay.. 328
Winter laying, commencement of.. 329

Robertson, R., Superintendent, Experimental Farm, Nappan, N.S.—Report of 335

Saunders, Wm., Director—Report of.. 5

Sharpe, Thos. A., Superintendent Experimental Farm. Agassiz—Report of.. 513

Shutt, F. T., Chemist—Report of.. 137

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Author Canada. Parliament
Title Sessional papers. Vol.36[6] 1902

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